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EDMUND RUFFIN, EDITOR AND PROPRIETOR.

THE ACTUAL STATE OF SILK CULTURE IN THE NORTH, AND REMARKS ON ITS EXTENSION IN THE SOUTH.

To the Editor of the Farmers' Register.

Some years past, I have been endeavoring to collect all the information that was accessible on the subject of the silk-culture, with the view of engaging in it as soon as opportunity should offer. And during the past summer I made a visit to some of the northern states, for the purpose of more fully satisfying myself, by personal observation; and to see with my own eyes what was doing there, that might justify the glowing accounts that were published in the agricultural papers. It is now my intention to give, in as fair and impartial a manner as I am capable of doing, the results of my observations; interspersed with such remarks and reflections as they have suggested.

In these times, when so much is done for effect, and when every new enterprise is ushered before the public with so much pomp and circumstance, it is natural that the sanguine should be easily led astray, and come readily to indulge in all the extravagances which characterize the projectors of novel schemes. In regard to silk-culture, though I am perfectly convinced that it will be both practicable and profitable, and that its introduction into this country will become, or ought to become, a general thing at no very distant day; yet considering the progress that has been actually made, and the little that has been accomplished, the wildest calculations have been made of its profits; theory has run far ahead of practice; and very few of those who make such extravagant boastings have tested its real advantages by experiment.

Some years ago, when the subject was first agitated with so much earnestness, a number of incorporated companies with large capitals were established in the eastern states. The most of these have now an existence only in name. Some of the most prominent of them, by attempting too much, and by combining the manufacture with the production of silk, have entirely sunk their means. Others have failed to make any dividends, through the incompetency of agents, or in consequence of the high salaries that were allowed them. Others again, and perhaps all, in a measure, have transferred their zeal from the legitimate object of their establishment, to the tempting allurements held out by the high prices of mulberry trees; and not one, as far as my information extends, has done any thing towards extending the knowledge of the silk-culture amongst the people at large, or made any attempts to introduce improvements in the management of the worms, and in the art of reeling and preparing silk. In the excess of their early zeal, the natural order of things was reversed. Lands were provided, buildings and fixtures erected, before there was any food for the sustenance of the worm. Having begun at the wrong end, and been then diverted by other considerations from carrying out the original object of their design, they have failed to answer the purposes contemplated by their formation.

Whoever therefore, depending on the ostentatious parade with which silk companies have been introduced to the admiring gaze of the readers of silk and agricultural papers, visits New England or elsewhere, with the expectation of seeing the silk culture carried on by them, and of deriving the necessary information from them for his own guidance, cannot fail to be disappointed. He must go to private individuals for instruction; he must get access into families, engaged in feeding worms, and observe their practices and management. It is amongst them only that any thing has been done, or from whom any thing can be reasonably expected. The silk business, in its present state of infancy, will not justify a large outlay, with a view to carrying it on to advantage. And especially is it necessary to consult economy in those places where the white mulberry is depended on as food for the worms. There is not, at present, skill enough in the country to justify the employment of agents, except under the immediate control of the person interested, to superintend the feeding of a large number of worms. When the business shall have been perfected in families, and the process of making silk shall have become generally understood, so that given means may be relied on to effect given results, operations may be extended to a larger scale with greater prospect of success.

At Northampton I expected to see greater progress made in the silk culture than at any other place in the United States. It has claimed for itself the merit of being the pioneer in the great work. For years the Northampton paper has been applauding the efforts that have been making to introduce and extend it. We were led to believe that it was the head-quarters of the silk business—the fountain from which instruction was to flow like a stream, to gladden and enrich the whole country. A great silk company, styled *par excellence*, the "New York Silk Company," was established there at an early date—a large capital was subscribed—a farm of several hundred acres was purchased at a great price—upwards of one hundred acres were planted in mulberries of one kind or other—a large factory was erected at considerable expense—and there the work terminated. The farm is now offered for sale; and the operations of the company are to be confined in future to the factory. Not a pound of silk, as far as I was informed, has ever been produced by the company. Glowing accounts have also been given of a silk company at Norwich, in Connecticut. Before leaving Virginia, I had been advised to take that place in my route, and was informed that silk would be produced there this year, not by pounds, or by hundreds of pounds, but by thousands! During the time I remained in New England, I made diligent inquiries about Norwich, and could not learn that any thing was in progress there that would instruct or interest a visiter. These examples are given as a fair illustration of what has been performed by incorporated companies. At Northampton, however, we are promised better things for the future; and something has been done during the past season,

both in the village and in the neighborhood, in the way of feeding worms. I saw one cocoonery, in which perhaps fifty thousand worms had just completed their labors; and another, erected on a large scale, in which nearly a million of eggs were in the act of being hatched. But there was a great scarcity of food; and liberal prices had to be offered to the owners of such plantations as were situated in the vicinity of the village, for whatever amount of foliage they could supply. So great has been the trade at Northampton, in mulberry trees, that out of the hundreds of thousands of seedlings which have been grown there within the last few years, the number of those planted expressly for feeding worms is very inconsiderable. Perhaps no place has dealt more largely in the article; and the practice of selling off so close as to leave none for feeding worms, has been the subject of considerable censure. A reformation has been promised in this respect; and I was assured by a prominent and enterprising culturist, that he was determined hereafter to retain the greater part of his trees for permanent plantations on his own grounds. Should he devote his energies to the silk culture, I know of none whose intelligence and qualifications are better calculated to insure success.

It is not my intention to charge either individuals or associations with a design to delude the public. On the contrary, I have no doubt that most of them were influenced by as correct motives, in advocating the adoption of the silk-culture, as generally govern the actions of men, willing to instruct others and promote their interests at the same time that they can do it with advantage to themselves. Neither do I believe that the silk culture is intended or expected to turn out a mere delusion. If companies have failed, individuals have been eminently successful; in a smaller way, it is true, but on a scale large enough to prove that the culture is both practicable and advantageous. A number of instances might be adduced to establish the fact that worms may be fed in this country, and carried through their various ages in perfect health; that the climate is admirably adapted to their welfare; and that silk of the best quality may be readily produced. The reason, therefore, that so little actual progress has been made, considering the much that has been said and written, and the great degree of public attention and even excitement that has been elicited in its behalf, is to be found in causes sufficiently obvious, and which have already been adverted to. The wonderful demand for the *morus multicaulis* and other valuable species of the mulberry, renders the cultivation of these plants the most profitable agricultural occupation that ever was followed in this country. A greater profit is to be derived from a few acres of land under this culture, than from large fields of wheat or corn, or even cotton or tobacco. As long as men will consult their interest, it is not to be supposed that the slow and tedious process of rearing silk-worms and reeling silk, however profitable it may be, compared with most other agricultural pursuits, will be prosecuted with full vigor, while the profit to be derived from the sale of the plant which constitutes the food of the worm, transcends in value that of the silk to be derived from it. While the demand for the mulberry continues to be extensive, and the prices high, it will be idle to expect that silk will be produced in large quantities. But in a few years, when the country comes to be well stocked, and the prices decline so much that sales can with difficulty be effected, a new state of things may be anticipated. There will then be no other resource but to appropriate the mulberry to its legitimate use; the community at large will be compelled by the force of circumstances to engage in the culture of silk, and we may then expect to see the business extensively flourish. In the mean time, the experiments that are making will lead to improvements in the management of the worm; every year will be adding something to the stock of knowledge, and contributing to ultimate success. The mulberry will shortly be in the possession of every family, or readily accessible to all; and no longer, as at present, capable of being monopolized by speculators, who having no interest in the establishment of the silk culture farther than to supply the plants, and never intending to follow it as a branch of industry, are intent only on deriving a heavy profit from them.

I am not one of those that object to seeing the mulberry sell at fair prices. If there was no demand for them, all attempts to extend the silk culture would fail. But I do object to making the mulberry culture and silk culture two distinct branches of business; and, above all, to the practice which many persons follow, of calling themselves *silk-culturists*, when they are only speculators in the plants, or growers of them for the market. None talk more largely of the benefits of making this a silk-growing country—none discourse more eloquently on the advantages to be derived from adopting the culture—while the main object is to create a demand for their trees. The press teems with "silk-growers' guides," and other publications, from the fertile pens of mulberry growers, demonstrating in glowing language the enormous profits of the silk culture. It would be desirable if public opinion could be brought to bear upon such persons, and compel them—a reasonable compulsion it would be—to appropriate some of their profits to the construction of cocooneries, in order to prove to those whom they are persuading to purchase, that silk may be profitably produced; and give them ocular demonstration that their trees are worth what is demanded for them. By this mode, the sale of trees might not be diminished; it would probably be promoted; but at the same time, every person would purchase with a knowledge of what he was doing; and the trees would fall into the hands of those who would endeavor to convert a portion of them into silk. Had this system been pursued, and light shed amongst the people, even the present high prices for the mulberry might not be above their value: at any rates, the demand would not be a factitious one. It is in truth a most valuable plant, if the silk culture is practicable, and deserving of higher appreciation, from the fact that it is reproduced with so much facility. Although the actual cost and labor of propagation are inconsiderable, yet its intrinsic merits so far surpass those of any other mulberry, that for an outlay of five dollars, a stock of plants may be obtained, in four or five years, capable of sustaining millions of worms. It would therefore be better to give even a dollar a piece for a few plants, than to give a dollar a thousand for the old white mulberry, which would only be fit to feed from, at six years of age, with a scanty

supply of foliage, and difficult to gather, even then.

It is generally considered that the multicaulis is the most valuable mulberry in the country. In the southern states, and as far north as to New York, and even in some parts of New England, it flourishes with great luxuriance; and the roots, and even branches for the most part, will withstand the winters without material injury. But for the more northern portions of the United States, it is extremely doubtful whether it can ever be cultivated to advantage. It is certain that in the neighborhoods of Albany and Northampton, its growth is stunted; but local causes exist to render those places colder than any others in the same parallel of latitude. The soil for a considerable distance round them is so light and sandy, that it parts rapidly with its heat whenever the rays of the sun are withdrawn or excluded. For the northern and eastern states, however, there are other species of the mulberry more hardy than the *multicaulis*, of a rapid and vigorous growth, and furnishing leaves of a large size and in great abundance. Distinguished cultivators there have their particular favorites. The Alpine was introduced and is patronized by Saml. Whitmarsh, the Canton by Dr. Stebbins, and the Brussa by some gentlemen of Albany.* At Northampton, there is such a confusion of names, that persons residing at a distance have very little idea of what their mulberries really are. Instead of being designated in such a manner as to be readily distinguished from all others, the specific term of *multicaulis* is applied to species entirely distinct, as well from each other as from the multicaulis proper. Thus the Alpine is called the *morus multicaulis Alpinense;* and the Canton, the *Canton multicaulis*. Both the Alpine and Canton have sufficient merits of their own to enable them to stand without any extrinsic aid; and the appropriation of terms to which a definite idea has been long attached, is calculated to mislead and produce a false impression. The Alpine is only known as having been brought from the foot of the Alps, where it was called the *Chinese mulberry*, and is the same kind for which, under this cognomen, the gentleman that introduced it was made the object of so much obloquy a few years ago. The odium that was cast on him then, was, as I am now convinced, very undeserved. The merits of the controversy turned on a name; and that name appears to have been inadvertently adopted, or rather continued in conformity with the designation of the species in Italy, and not with the intention of passing it off as the genuine multicaulis. The effect, however, has been to impair his usefulness ever since.

If the silk culture has not advanced with the rapid strides, in the states where it received its first impulse, which were predicted of it; yet it has made some progress in other places, where it has been recently introduced. A much larger number of worms has been fed during the past season than has ever been fed in one year before; and complete success, as far as I had the opportunity of observing or ascertaining, attended the management of them. In New Jersey, Pennsylvania and Delaware, and on the Eastern Shore of Maryland, much more has been done than in any other parts of the country. A considerable stimulus has been given to the business, in some of those states, by the liberal bounties upon silk produced within their respective limits. A large proportion of the late crop of cocoons was reserved for eggs for another year; and even now the demand for eggs is almost as great as that for mulberries. The experience of this year has satisfactorily proved that even from trees, the growth of cuttings and layers planted in the spring, worms may be advantageously fed the ensuing summer. It is only necessary to retard the hatching of the eggs by placing them in an ice-house, which should be done before the warm weather in the spring comes on. By this means, they have been kept till midsummer. Under any circumstances, the hatching may very properly be delayed till the early part of June, which is probably as soon as worms should be brought out even in Virginia. The cold, wet weather of May, which is frequently a disastrous period to the young worms, is thereby avoided; and the natural time of hatching is only postponed about three weeks. Whether they can, for a number of years, consistently with the health of the insect, be prevented from hatching until the latter part of July, may be regarded as doubtful. The practice is so contrary to nature, that it will not be at all surprising if the effect should prove unfavorable. Neither would any necessity exist for it, if the culturist would reserve a small number of standard trees or roots, and make use of the two-crop worm for his second and third crops.

I have no information which would enable me to state with precision the quantity of silk that may be produced from an acre of ground. During the past season, one gentleman in New Jersey obtained from the sixteenth of an acre, a product at the rate of 56 pounds per acre, from trees of the first year's growth. Had the trees been a year older, the quantity of silk would no doubt have been fully doubled; and might have been still further increased by successive crops. The cocoons of this year were almost invariably firm and heavy; and I heard of no worms that fed longer than twenty-eight or twenty-nine days; the usual period of their lives being thirty-five days. This abridgment of the ordinary term of their existence, is to be ascribed to the high temperature of the summer; for we know that, under different circumstances, it is sometimes prolonged to forty days. The past season, hot and dry as it was, appears to have been very favorable to the health of the worms. I heard, on respectable authority, that a culturist in Delaware had fed 150,000 with a loss of not more than twenty. Among all that I saw, some of which were a good deal crowded, I observed no symptoms of disease, and heard of none prevailing elsewhere. One or two facts that came within my knowledge, showed that much care is requisite in the treatment of eggs when the hatching is to be postponed. It is acknowledged by all, that it is important to keep them dry; and to guard against the least admission of moisture, some persons put them in bottles and seal them air-tight. Whenever the eggs remained in this condition for any length of time, their vitality was entirely destroyed; while others of the same parcels, but treated with less care, hatched without loss.

* Charles Rhind, Esq., formerly minister at Constantinople, introduced the Brussa mulberry. See his communication to the Farmers' Register, page 55, vol. V.—Ed.

Without intending to make any invidious comparisons, and premising that there were many places where the silk culture was said to be thriving, which I did not visit, I have no hesitation in saying that there was more doing at Burlington, New Jersey, considering how recently the business has been started there, than at any other place which came under my observation. A considerable number of persons were engaged in feeding worms as well as in raising trees. A few extensive cocooneries had been erected, one of which was large enough to accommodate about a million of worms; and several others from one to two or three hundred thousand. The soil in the vicinity of Burlington, is light and sandy, and well adapted to the growth of the multicaulis. Indeed the greater part of New Jersey is admirably suited to the purpose; and the business is so rapidly spreading, that in a few years, that state will probably be much in advance of any other. Within a few years the improvements in the construction of cocooneries, have contributed greatly to the facility of feeding worms. The plan of those at Burlington, struck me as being rather superior to any I saw elsewhere. The necessity of handling the worms is entirely dispensed with by the use of hurdles of net-work; at the same time that the cleansing of the shelves and the removal of the litter are more easily effected. When it is time to change them, another hurdle is laid on the one containing the worms, and fresh leaves are sprinkled over it, which are always cut up by running them through a cylindrical cutting box. In a few hours, the worms attracted by the fresh leaves, get on the upper hurdle, when the lower one, containing the litter, is removed. In this manner, a large number of worms may be cleansed in a day, by providing extra hurdles. A better fixture for the accommodation of the worms in spinning, has been latterly introduced. On the lower side of the shelf immediately above, which is not more than twelve or fourteen inches distant, strips or laths, about two inches wide and three inches from each other, are fastened at right angles to the range of shelves, to which the worms mount by very simple ladders, and spin their balls along the junction of the strips and floor. This mode adds greatly to the convenience of gathering the cocoons, and the floss is removed from them free of the litter which attends the use of brush or dried leaves. A room thirty feet wide will admit of four ranges of shelves, three feet wide, leaving an aisle between each range, and also between the outer ranges and the walls, of three and a half feet. The number of shelves in each range will be in proportion to the pitch of the room; say six shelves for a room, nine or ten feet high. Each hurdle is three by four feet, and will accommodate a thousand full-grown worms. On this plan, a room of a hundred feet in length by thirty feet in width, with a pitch of nine or ten feet, will accommodate, without crowding, about half a million of worms at a time. But in a cocoonery, near Frankford, in Pennsylvania, which was not of much more than half these dimensions, six or seven hundred thousand worms were fed in June last, which spun well. They were, however, evidently too much crowded, as was shown by the small size of the cocoons; and had not the season been of the most favorable character, the whole brood would have been in danger of being swept off by an epidemic. In a small room at New Haven, in a house occupied by a Frenchman, which did not exceed ten feet square, he had successfully fed forty thousand worms, without the appearance of any disease amongst them. I saw a number of the cocoons, which were large and firm.

Many persons have amused themselves, and the public too, by making calculations of the great profits of the silk culture. It may be no difficult matter to state with tolerable certainty how many good cocoons will yield a pound of silk; but I think an error has been frequently committed by estimating the product *per acre*. Of mulberry leaves, as well as every thing else, the crop will be very variable, and depend on the quality of the land. If worms can be preserved exempt from disease, and good cocoons can be obtained from them, the number that an acre of ground will support, at the usual prices of land in our country, is a matter of very subordinate interest. It is only important when land is worth from one hundred to three hundred dollars per acre. When the value does not exceed five or ten dollars, as is the case with most of our lands, it is better to estimate the profits of the culture by the number of worms that may be fed, than by the quantity of land that it will require to supply them.

While so much is doing in some of the states to the north of us, for the advancement of the silk-culture, scarcely any thing has yet been attempted in Virginia. The attention, however, of some individuals, has been directed to the subject; and an interesting experiment in feeding worms has recently been detailed in the 'Farmers' Register,' by a gentleman of Brunswick. A very large cocoonery has been fitted up at Fredericksburg, which will probably be filled with worms next year. Other gentlemen are making arrangements to enter upon the culture. During the ensuing season, it is hoped that interesting results may be established by various persons. But, unfortunately, almost every tree grown in Virginia and North Carolina, with the exception of those retained to propagate from another year, has been bought up, and will be taken to Pennsylvania or New Jersey. The Virginia and Carolina trees have a decided superiority in the northern markets, and are sought after with avidity; a fact of which the cultivators here are perhaps ignorant. Southern trees are mostly produced from cuttings, while those of northern growth are raised from what are called *layers*—that is to say, a whole plant, both root and stem, is laid horizontally in a furrow, and covered over with earth. The young shoots sprout up so thickly that they make a spindling growth. Plants from cuttings, on the contrary, having more distance, throw out a number of side branches, and furnish a much greater supply of wood, which, besides that it is better matured by our southern sun, adds considerably to the market value. It would be desirable to know what number of trees have been grown in these two states during the present season. It will probably not fall much short of half a million; and next year, the number will no doubt be two or three times as many. But as long as we send them abroad, we are doing nothing towards the advancement of the silk-culture in our own state. And if there be any state in the union that would be more benefited by the introduction of this culture, allowing it to be, as is contended, both practicable and profitable, or

whose soil and climate are better adapted to it, or where it can be prosecuted with greater economy in reference to labor, I should be at a loss to point it out. We occupy that position in regard to climate, which is too far north to admit of ours being a planting state; and too much to the south to be a first rate grain-growing or grass-growing country. We have extensive tracts of impoverished land in which the mulberry will flourish without difficulty, and where nothing else will grow. Our dry and long continued summers are eminently favorable to the health and prosperity even of successive crops of the silk-worm. We have in almost every family a number of unprofitable hands, either too young or too old to be put to constant employment; and the more intelligent portion of our colored population, remarkable as they are for their tractableness and powers of imitation, would soon learn to conduct all the operations of the coconery with neatness and skill.

Many of the states to the north of us have encouraged the introduction of the silk culture by legislative bounties; and I am convinced the wisdom of this policy will be justified in due course of time. If from causes already pointed out, but little has yet been accomplished in the production of the article thus encouraged, yet the ground-work has been laid, and the superstructure will be erected upon it. The seed has been sown, which will produce, some ten, some twenty, and some possibly a hundred-fold. It will, however, necessarily be a work of time. It may be another generation, and yet another perhaps, before it is established on a durable basis. But with a climate like ours, and with a species of mulberry superior to any hitherto known, the energies of the Anglo-Saxon race will eventually command success. The mental resources, the quickness of perception, the determined perseverance, which constitute the distinguishing attributes of this people, will enable them to triumph over every difficulty, and achieve all but impossibilities.

T. S. PLEASANTS.

Goochland, September 15.

For the Farmers' Register.

THE CROW (OR DAW?) A BIRD OF PREY.

Surry, Sept. 12, 1838.

A few weeks ago, whilst I was at a gentleman's house of this county, I witnessed an act in a crow, (the corn-dealer,) which was entirely new to me, and it may be so to some of your subscribers.

My friend and myself had been noticing his flock of young turkeys, then about a week old. He was complaining of the depredation and havock the crows were playing among them, saying that he expected to raise not one out of the whole. This excited much surprise, and induced me to watch for, and to notice the movements of, the crows. Whilst talking about them, or in a very few moments afterwards, there came one, (and crow he certainly was,) and immediately attacked the young brood, and after one or two unsuccessful efforts he succeeded in taking up one, in spite of every attempt of defence of the mother hen, and bore it off, in every respect similar to the hawk. It may be said, that this was a jack-daw, a smaller, and a different bird from a crow, as some contend. I, as well as my friend above, believe them to be one and the same bird. But whether crow or daw, it is immaterial; it was one of that family, and one of a large and full size.

By your reader, D. S.

From the Farmers' Cabinet.

A TRIP TO MARYLAND.

We passed over the bridge at Wilmington, into the rich alluvial bottoms of the Christiana creek, which extends nearly a mile from the city. The causeway is hemmed with two rows of beautiful trees, and surrounded with luxuriant pasture-grounds, that have, within these few years, been very considerably cultivated and improved. The high-land immediately connecting those rich bottoms, is gravelly and poor, but the immense amount of manure produced by the marshes, enables the farmer to force vegetation in every corner of his farm, and thus make his habitation a place of comfort and plenty.

The land through New Castle county is tolerably well improved; much of it is under cultivation, and the crops of wheat look well and bid fair to produce at least an average quantity; oats and corn not forward enough to form any opinion.

In Maryland, where the ruinous three-field system of farming prevails, the wheat looks bad enough to alarm one with the fear of want, notwithstanding some of her most intelligent citizens are inclined to the opinion, that the prospect is in favor of a medium crop.

As we advance towards the table-land that divides the waters which flow into the Delaware and Chesapeake, we find a kind of soil perhaps the most congenial to the growth of wheat of any in the United States, and why it is not a subject of deeper interest to the inhabitants of Pennsylvania, particularly to the enterprising citizens of Chester and Delaware counties, is a matter of some surprise.

In Chestertown we found land selling at five dollars per acre, and shell lime at six cents per bushel, neither of which seemed to excite any anxiety among the farmers, though the land was about a mile from the wharf, and the wharf within a few hours' sailing of the city of Baltimore.

On many of the farms upon the Eastern Shore, there are immense beds of shells spread over acres of land, and in some places six or seven feet deep, in a perfectly sound state, yet covered with mould, perhaps the growth and decomposition of grass and trees for many a century. A white oak that measured fifteen feet in circumference, had once reared his lofty head over those banks, but was now prostrate in a wilderness of underwood, with his tangled roots jammed full of shells, and most of them without any appearance of ever having touched the earth. Shells make the purest and best of lime; by a chemical analysis, it is found to contain little or none of those foreign substances that constitute from twenty to thirty, and in some cases, as much as forty-five per cent. of stone lime.

Shell lime can be had on the Eastern Shore at a very small expense, compared with what a Pennsylvania farmer pays for stone lime, even if he should be so fortunate as to have a limestone

quarry upon his farm; and yet such is the desponding condition of agriculture in this country, that little or no attention is paid to the subject.

We visited Wharton Point, a high bluff of rolling-land that projects some distance into the Chesapeake, and forms rather a pleasant prospect of land and water scenery; but what was far more interesting, were the beds of shells which cover a space perhaps of fifty acres from one to six feet deep.

This property lies nearly opposite the mouth of the Susquehanna, which is constantly disgorging great quantities of all kinds of drift wood upon the shore. With this wood they burn the shell lime at an expense of about two cents per bushel.

The proprietors of this estate live in Delaware, and are making efforts to introduce the Pennsylvania mode of farming into the neighborhood; they have now on hand thirty-thousand bushels of shell lime, which is to be drawn out this season and spread at the rate of one hundred bushels to the acre for the next year's crop. We had taken with us small quantities of ruta baga, mangel wurtzel, and sugar beet seed, and here we found a person willing to prepare a piece of ground to try the experiment of root-culture with the siftings or dust from the shells as a manure. We likewise engaged him to make an experiment upon an acre of poor land in raising of wheat. We directed him to turn the land down with the plough, spread upon it one hundred bushels of shell lime, sow it with three bushels of oats; when the oats had grown up and was beginning to change its color, roll it down, plough it in and sow the ground with two bushels of corn broad cast; about the second week in October, roll the corn down, plough it in and sow the ground with wheat. To give this experiment a fair trial, the oats should have been sown in the early part of the fourth month.

I am inclined to the opinion that the above plan would make the principal part of Delaware and Maryland produce twenty bushels of wheat to the acre, which, at $1.50 per bushel, would buy the land and pay all expenses of lime, seed and labor, and if laid down with clover, would, for a succession of years, produce good crops of hay and pasture. Such an investment of idle money would be more profitable than shaving notes at two per cent. a month, besides the additional security of real estate, and the satisfaction every generous mind must feel in the reflection that his labor has made two blades of grass grow where but one grew before. This peninsula possesses local advantages that few places in our country can boast. A soil peculiarly adapted to raising of grain, one that is easily improved and very difficult to wear out. It is watered with such a number of creeks, outlets and bays, that many of their farms are bounded by navigable streams, and very few indeed that lie further than five or six miles from a landing where abundance of lime and plaster can be had at reasonable prices, stone lime from the Schuylkill sells from sixteen to twenty cents per bushel, and shell lime at about half the price.

While so many are enamoured with the "far west," parting with their friends, their homes, and their fire-sides, for a prospect of buying land cheap, and being independent, for $1.25 per acre, could here buy hundreds of acres for less than nothing, compared with the wild lands of the west, and that too within a day's journey of three of the largest cities in the Union. I say less than nothing, for such is the depressed state of agriculture in the peninsula, that farms are often sold for less than the buildings, fences and other improvements have cost.

It is certainly a question of some importance, whether the worn-out lands of Delaware, Maryland, and other parts of our country cannot be improved at less expense than to clear off the almost impenetrable forests of the west. When we consider the time it necessarily occupies to clear and make ready for the plough a hundred acres of heavy timbered land, the expense of labor, where labor is not easily obtained, the distance from market, the privations and hardships inseparably connected with new settlements; it seems at least worthy of an experiment to ascertain the fact. A SUBSCRIBER.

Wilmington, Del. 5th mo. 18, 1837.

THE MARL INDICATOR.

It has been long and generally believed among the marling farmers of King William county, and the adjoining country, that the growth of a certain plant, in running water, indicates, with absolute certainty, the presence of marl, or beds of fossil shells, some where higher up the stream. The great value of any such indication, to those who are searching for marl, is obvious. We were informed of the peculiar rule of location of this plant several years ago, by our friend and correspondent, Dr. William B. Westmore, then a resident of King William; and, at that time, requested such particular information as would enable us to identify the plant, and, by publishing the description, to furnish all the readers of the Farmers' Register the means to avail of its use, in showing the before hidden presence of marl on their lands, or in their neighborhood. Dr. Westmore caused a correct colored drawing to be made of the plant, by a good artist who happened to be at his house; and from the drawing we have had engraved the representation which accompanies this article; and which, with our own description, may enable persons without botanical knowledge to identify the plant. But to those who possess any thing of that knowledge, (to which we have no pretension,) a much surer means of identification is offered in the following report of the botanical character of the plant, which was furnished at our request by a correspondent, who is much better informed on the subject, and to whom the growing plant was exhibited. His report was as follows:

"I carefully examined the plant you pointed out to me, when here, as indicating the presence of marl in the earth, or as growing only in streams supplied with calcareous matter. Though the flowers are very small, the botanical character is obvious, and easily determined. The plant belongs to the second class and first order of the artificial system, (*diandria monogynia,*) and to the genus *Veronica* of that order. Loudon describes 84 species of this genus, only one of which (*Veronica Virginica*, with a variety, *Incarnata,*) is American. This plant does not agree with any of the numerous species described by Loudon, and I very much doubt whether it is described by any bota-

The Marl Indicator.

nist. I would, therefore, be inclined to consider it a new and important species. Its botanical description is—root fibrous, stem smooth, leaves opposite amplexicaul, lanceolate, slightly serrate, flowers racemose, axillary, calix four-toothed, corolla light blue, entire base; lip four-parted, capsule two-celled. Should this be (as I think there is every probability) an entirely new species of *Veroncia*, would you permit me the liberty of suggesting a specific name—*Veronica Ruffinia?* If its presence is a sure indication of marl, it is a highly important plant, and your name is almost identified with marl."

We beg leave to decline the unmerited honor above proposed, as we have no claim to the discovery—and but only that of having appreciated the facts, as soon as they were heard of, and now of making them public. We should think the name of *Westmorea* more appropriate; but our friend Westmore also waives all claims to the discovery, and says, that he does not know who first noticed the connexion of the plant with marl. And if, contrary to the present supposition, the plant should in fact have been long on the catalogues of botanists, it will not the less deserve to be considered, for its peculiar quality now just brought to light, as a new and important agricultural discovery. We prefer for its name, the descriptive one of the "Marl Indicator."

But we have further evidence of this being in truth a new species, in the opinion of our friend and correspondent, Gideon B. Smith of Baltimore, to whom we sent the drawing to have it engraved, accompanied by a statement of the peculiar value of the plant, and a copy of the foregoing botanical description. His answer says—

"I cannot determine the botanical character of the plant from the drawing, but it certainly appears to be a Veronica. The description of the plant and the drawing agree perfectly, so far as I can follow the latter—the characters of the corolla, calyx and capsule not being distinct in the drawing [owing to their small size.] The plant is new to me; it is not described by Loudon, nor, so far as I can find, by Elliott, nor any other botanist to whose works I have access.

"It will be a curious and valuable discovery for the agricultural interest, should it prove to be in fact an indication of the presence of calcareous matter; and I shall certainly bear it in mind in all my botanical rambles."

We readily found this plant growing in several of the rivulets flowing through different beds of fossil shells, or marl, on our farm. For the fact that it is to be found in none other than such streams, we have as yet to rely on the information of others; and on the certainty of its absence as well as its presence agreeing with the absence and presence of marl, obviously depends the value of the "indicator."

The plant is an evergreen; it grows only in shallow water. The stalk is seldom more than a foot high; though we found some 2½ feet. It is so succulent and tender, that it droops and withers very quickly after being pulled up, and left dry; but when immediately placed with the roots in a bottle of water, it continued to live, and to throw out successive flowers for several weeks. It was in flower in May, and had not ceased to flower in the beginning of September. The flowers are very small, of a pale blue, or nearly of a lilac color, and appear in small clusters, or strings.

We have taken much trouble and incurred some expense, to enable our readers to identify this plant. It is hoped that many will search for it, and test its alleged peculiarity of location; and if observation should serve to disprove that peculiar character, it is further hoped that such observation and facts will be communicated for publication. To correct erroneous opinions, and mistaken facts, is as useful and as necessary to agricultural knowledge and improvement, as to announce new and undoubtedly true opinions and facts.

As no calcareous earth exists in the tide-water region of the southern states, except the fossil shell deposite, or marl as commonly termed, of course the growth of this plant, when found any where in that region, will always indicate that form of calcareous earth only. But if it grows among the mountains, and in more northern as well as more elevated lands, it will probably be found in all limestone streams.

AGRICULTURE OF UPPER FAUQUIER.

To the Editor of the Farmers' Register.

In fulfilment of a promise which I made you at the Fauquier Springs, I proceed, at as early a moment as it is possible to compose my faculties, after the stir and bustle of that deservedly popular watering-place, to give you some account of our agricultural operations in upper Fauquier. I could well have wished that this task had devolved on abler hands, and it is only in consideration of the honor done me by your request, that I now make the effort.

Before entering on the subject immediately in hand, I beg leave to be indulged in a few preliminary observations. Farmers scarcely ever write well, in consequence, perhaps, of the "difference between the diameter of a pen and a plough-handle." Be this, however, as it may, I consider farming, of all subjects in the world, the most difficult, in every thing which relates to it. To plough, to sow, to reap, garner and to gather; to sell, to buy, to use and not to abuse, are all apparently the most simple things imaginable; but, in practice, we know that each and every one of these operations are attended with difficulties which no novice can appreciate, and to overcome which, many men have utterly failed, even after growing gray in the service. And to render to the public a graphic description in detail of even a part of the mysteries of this wonderful trade, is found to be no less irksome, than to lead the operatives in the field.

On this subject, at least, the world has certainly had the advantage of a great deal of practice, without treasuring up, however, the benefits derived from much useful experience. The truth is, that from the diversity of soil, climate and the seasons, the operations of an agriculturist cannot generally be reduced to any fixed rules, and hence the knowledge of the art, is not, to any available extent, transmissible. The writings of almost all the agricultural associations and societies that ever existed, are now laid upon the shelf as useless lumber. Every man has to be the founder of his own system, and even *that* it is often necessary to change from year to year. In proportion to num-

bers, there are few good farmers in any country: and even among the best of them, success rarely results in the accumulation of large fortunes. A competency—a very moderate degree of independence, is all which the most of us aspire to, and even that, many fail ever to get. To make a good farmer, it requires a combination of prerequisites rarely to be met with in the same individual: he must possess the patience of Job, the wisdom of Solomon, the eyes of Argus, and the equanimity of a saint.

It is said, that between man and the earth there is a natural sympathy: the earth, "from which in sorrow he came, and to which in sorrow he must return." Every man, at some period or another of his life, aspires to the honor of becoming a cultivator of the soil; to plant a tree, the fruit of which he may never taste; to build a cabin or a villa; to enjoy a little of the "*otium cum dignitate*," supposed to be incident to the profession; to rear up an inheritor of his name and fortune, and to deck the bosom of that earth, in which he knows, at no distant day, he will find a grave.

Adam, our great progenitor, was a farmer, or, at least, it was intended that he should be one, even before his fall; for, when placed in Paradise, he was directed "to keep it and to dress it:" but he lacked experience, and managed his affairs very badly, for he lost his inheritance, "which brought death into the world, and all our wo," before he probably had pitched his first crop. Most of the patriarchs were graziers; and that rich old gentleman, Abraham, was one who did no discredit to the profession. In his entertainment of the three angels, who unexpectedly paid him a visit, his running "to fetch a calf, both tender and good," and his directions to his dutiful wife, Sarah, to cook the cakes on the hearth, we have a most beautiful picture of primeval hospitality and simplicity. The fare was plain and abundant; but how different the style from that of a wealthy herdsman of the present day!

To feed well, is one of those indispensable requisites, that cannot be too often inculcated. A farmer should feed every thing well, and last, though not least, he should feed himself well. His house should be the seat of social comfort, of hospitality and affluence. I hold no communion with your lank-visaged Shylock: he, who exacts "his pound of flesh," eats little himself, and drinks—he drinks water; and there is, after all, no real sociability without the occasional use of the "wine-cup." We are pleased with the caricature of a "turtle-fed alderman;" we are delighted with the admirably drawn character of Falstaff, the personification of good living, the very prince of good eaters and deep drinkers; we can pardon, at least, the vice of a hospitable "landlord, who never suffers a guest to leave his table, either sorrowful or sober."

There is no truth in the adage, "that there is no place like home, though never so homely;" many a poor fellow, with at least an ordinary share of the milk of human kindness in his soul, roams through the wide deserts of this cheerless world, until brought up at last by starvation and death, for no other reason, but that he has no home, or none at least with such endearments as to make life desirable—no blazing hearth—no smoking board—no prattling children—and worse than all, "no eye there, to look brighter for his coming."

A farmer should retire early to bed, and require no such monitor as Dr. Franklin, who once informed the citizens of Paris of the astonishing fact, "that at 5 o'clock the sun was up, and that it was quite light;" but with his eyes wide open, at early dawn, let him "first see that all is right, and then go ahead," without the necessity, however, of wending his way, either to "the Devil or to Texas."

I cannot speak for others, but I know that farmers like a warm fire—a cheerful candle—a comfortable bed; they like to dream of pleasant times that are past, and of a joyous prospect to come—"of wife, children and friends"—of fat beeves, of full hog-pens, of heavy stack-yards, with real old-fashioned Bonaparte pieces booming in the distance.

After this long preamble, it is time to come to the real object of this letter, and, to do it to your satisfaction, I shall try and "begin at the beginning." Fauquier county is one of the largest and most populous in the state, east of the Blue Ridge Mountains. It is composed of two large oblongs, joined together by a narrow neck of land, just at Warrenton, a little above the White Sulphur Springs. The land in the lower section is not good, the upper and larger section I shall now attempt to describe. From Warrenton to Salem, there is a good deal of poor land, but above Salem, in the direction of Farrowsville, Upperville and Middleburg, the land is generally excellent, some very tolerable, and only a small portion ordinary. The country generally is broken, rough, rugged, hilly, mountainous, stony and rocky. It is as healthy as Montpelier, and as finely watered as any portion of the habitable globe. It is a fine farming country, though not picturesque; it is occasionally romantic, but not generally pretty.

A traveller, in passing along any of the public highways, would not be impressed with the beauty of the scenery, the good appearance of the houses, or the excellence of the cultivation. Wood is in many places scarce; but still Volney would pronounce it, in comparison with France, "a great forest;" so great is the predominating effect of wood land over cleared and open fields. The general surface, as presented to the eye, is not only rough and broken, but intersected by numberless branches and little swamps, left for the most part intentionally uncleared. These, though unsightly, answer the double purpose of protecting the springs and streams of water, and of affording shelter for cattle.

The soil, in its natural state, is generally good, but not first rate, as compared with that fine region of country in Maryland, between Hagerstown and Frederick, or with some localities beyond the mountains. As far as I have been able to ascertain the fact, it is composed of seven-tenths of clay, two-tenths of sand, and the remaining tenth of vegetable matter, a little iron, and a small quantity of calcareous matter, with a substratum of stiff red clay. There is certainly too little *humus*, and probably too much clay for a perfectly good soil, or for it to be ploughed easily.

Large crops of wheat are grown in upper Fauquier, and we consider it an excellent soil for that grain, and inferior only to good limestone land; for corn and oats, it is better than any limestone; for rye, it is unsuitable; but for grass, when aided by plaster, it is unsurpassed by any land in America.

This fact points to a source of profit in grazing, to which we have not been slow in resorting—as many cattle being fattened in this section of country as in any other area of equal extent in the Union.

We sow a great quantity of clover and other grass seeds, and use plaster liberally on every plant which we attempt to raise, and this sometimes acts with an energy truly astonishing. We work well—we plough well—we cultivate well. But what constitutes good cultivation? not certainly the deepest ploughing, as supposed by some, or the most frequent ploughing and harrowing, as advocated by Tull. Without pretending to any skill in definitions, I should say, that is the best cultivation, either for wheat or corn which most completely destroys, or holds in obeyance, all spontaneous vegetation, so as to give the crop a monopoly of the soil. The *most perfect* cultivation for wheat would be, to plough in the spring, to cross-plough after harvest, harrow—sow the seed, shovel in, and then harrow again. But this is not the Fauquier method of doing the business; neither is it the best way: a single good ploughing, by which I mean that the surface should be completely turned under, with the wheat sowed on the rough surface, if there be not too many clods, and then two good harrowings are all-sufficient.

The reason for this is very obvious, which it may be as well perhaps to state. When land is first ploughed, the vegetable matter turned down undergoes a decomposition more or less violent, agreeably to the presence of heat and moisture. When the grain is sowed, immediately after the ploughing, it receives the gas as it is generated, like a plant in a hot-bed. But if the land be ploughed a great while before seed time, there is a loss of all the volatile part of the manure, which failed to combine with the soil. And the same reasoning is applicable with still stronger force to the corn crop. Fall ploughing for corn is now very generally abandoned.

In farming, generally, we use much less manual labour than our brethren in lower Virginia; we depend more upon the cheaper service of the horse and the ox. The plough has in a great degree superseded the use of the hoe. It may be admitted, however, that we have too little manual labour. And this proceeds from necessity. The "cotton fever," which raged so intensely a few years since, to the south, not only carried off some of our most active and enterprising people, but deprived us to a very injurious extent of our negroes. I shall not stop to bandy words with those who may deem this a blessing; it is sufficient for my purpose now, barely to state that we, whose interest is most affected, view it in a very different light.

In a country so rough as this is, where there are so many stones, both in the ground and out of the ground, and so many fences yet to be made out of them, a very strong force might be used to advantage, independently of that which is necessary for mere cultivation. The farms, also, are generally rather large, with a strong, but very natural tendency to accumulation in the hands of the few, to the exclusion of the many. "The rich are becoming richer," but the poor, not being willing "to become poorer," are going where they can "get richer" too—they are going to "the great West."

A great deal is generally supposed to depend on a judicious rotation of crops; but the most important thing at last is not to cultivate the land too frequently in any crop. Exposure to the influence of the atmosphere is of much more injury to a soil, than the loss of that portion of vegetable matter, which constitutes a part, and only a small part, of the food of plants. A quick rotation is generally adopted, from the fear of the effects of blue grass; but this, like every other vegetable, or animated production of the earth, has its period of youth, maturity, and decay, and a sod of five years' standing is more easily subdued by the plough, than one of three, besides possessing the advantage of being able to bring from a fourth to a third more grain. The grazing of so many cattle enables the farmers of this neighborhood to keep a large portion of their arable land constantly and profitably in grass. This accounts for the rapid improvement of the country, and the prosperity of the people.

The proprietors of upper Fauquier are generally the builders of their own fortunes. If we have few very rich men, we have, on the other hand, not many that are poor: the great mass is composed of "middle interest men," the bone and sinew of every country. Some of the refinements and luxuries of the world may yet be wanting, but we live abundantly, and, I hope, hospitably. To the ornamental part of our profession but little attention has been paid; our farms have nothing of that garden-like appearance, with which Hazlitt was so delighted on a long journey through Lombardy; neither are our dwellings embowered in trees, or embellished with tasteful enclosures, and the beautiful shrubbery and flowers of the sweet little cottages of England. But, the Bible says, "there is a time for all things." We now "go for the main chance," and hope to leave to our children, the means, and there will be plenty of room, for the exercise of all their taste in ornamental agriculture.

I remain,

Your obedient servant,

R. B. BUCKNER.

St. Bernard, 20th September, 1838.

For the Farmers' Register.

THE THEORY OF MANURING WITH LEAVES, SUPPORTED BY A FEW EXPERIMENTS.

There are no truths in the science of agriculture, not immediately obvious to the senses, more susceptible of proof, than that much the greater part, if not the entire substance, of every vegetable is constituted of precisely the same elements, or materials, merely differing in their proportions; and, consequently, that every vegetable substance, when suitably reduced or decomposed, is food for growing plants of other kinds. Hence it must necessarily follow that every kind of vegetable matter must be an alimentary manure; and if it does not act as such, or to much extent, that it is not because the substance does not possess the raw material of which to make manure, but on account of some inconvenience attending its form, or defect in the mode of application.

Upon such grounds, theory would pronounce, even if practice had not at all confirmed it, that

the leaves of trees furnish a material for alimentary manure; and, in as much as the quantity in the reach of most farmers in Virginia, is super-abundant, that this resource for fertilization, if properly used, would be of incalculable value, on all lands so constituted as to be profitably enriched by any other vegetable manures. On soils wanting this proper constitution, profit is not to be expected, either from leaves, or from far richer vegetable manures.

But, putting theory aside, (as its authority is deemed of but small value by most cultivators,) there are enough examples, in the regular practice, and the results, of many successful farmers, to place beyond question the advantage and profit of using leaves as manure. Many striking facts of extensive and successful use of leaves as manure have been reported in the Farmers' Register, in the practices of sundry good farmers, and profitable enrichers of land.

Still, however, many other farmers have commenced, and made, for a while, energetic efforts to collect and apply leaf-manure, and have encountered so much trouble for so little of appreciable or manifest improvement, that their efforts soon slackened, or totally ceased, because they were supposed not to be compensated. Such was the impression and the course of the writer of these remarks, after a very large use of leaves for one year. But being now satisfied that the failure was owing to his own improper practice, and not to the want of value in the material used, he will state what he believes to have been his and the general errors in the mode of application; and the few facts since ascertained, as well as the reasons, which recommend a different and cheaper mode.

Though nearly the whole of every vegetable substance is a material for manure, and capable of becoming food for growing plants, it is far from being the case that all, of any one substance, is ready so to act at any one time. And it may well be with some substances, which strongly resist rotting and decomposition, that the portion which is fit to feed plants is so small, at any one time, and the proportion of the unfit (and for the time, therefore, hurtful,) so large, that no profit, or perhaps benefit, would be derived from the most abundant applications. No part of vegetable matter is ready to act as manure, unless it is at the time soluble in water; as it is only when fluid, and dissolved, that it can be taken up by the very small absorbing mouths of the roots of plants. (See Davy's Agricultural Chemistry, Lect. I, and VI) Therefore the deduction is clear, that if of 100 pounds of leaf-litter, applied as manure, 5 pounds only are soluble, the other 95 pounds are, for the time, useless; and, if buried in or mixed with the soil, may even be injurious to the crop. Saw-dust is a vegetable substance, containing still less soluble matter, and is very slowly decomposable; and though its entire substance also is capable of becoming food for plants, and of course manure for the soil, yet it has not been found worth using, in any common mode of applying manures. Tanner's spent bark, also, for immediate or speedy action, is worthless as manure, and would do more harm than good to the first crop. Vegetable substances, of a more decomposable nature than these, when under a low temperature, continue undecomposed, and of course insoluble, for ages; and, in that state, are a cause of sterility, instead of being manure to the covered soil. Such are the peat lands of Scotland, and other cold and moist countries. In such regions, there is but little of naturally poor land which, if let alone, will not, in the course of time, be covered with some inches' thickness of peat, or pure and solid vegetable matter, formed from the annual dying and deposite of the plants growing thereon; and in the most favorable situations, this covering of inert and almost barren vegetable matter, increases to many feet in thickness. Yet all these vegetable substances are still composed of materials fit to be converted to food for plants. This conversion of peat has indeed been made, in practice; and not only in scientific experiments, but economically, and profitably, in practical agricultural improvements. The means used were to make the peat into compost, with both alkaline and highly putrescent animal manuring substances, so as to induce fermentation and decomposition in the before inert and dead peaty matter. Such would be the case with any other of the least decomposable and soluble of other vegetable matters. But though theoretically true, it may well happen that the returns from some such substances would not compensate the labor and other cost of converting them to active manures. Such, however, is not the case with leaves; which, in this climate, are not too slow or difficult to decompose, even without any admixture of either alkaline or animal matters, and which are far richer in nutriment than the more intractable and insoluble substances named above for illustration.

But while maintaining the value of leaves to be important, on account of their great quantity, and usual cheapness, it is not pretended that they are to compare in richness, bulk for bulk, with straw. Upon the grounds stated above, it is presumed that their whole substance is a fit material for food for plants, and therefore may be entirely converted to manure. But still it will be a poor manure, in comparison to most others in common use, and of established value. Articles of food for plants, like those of food for animals, may be altogether nourishing; but yet nourishing in very different degrees. Thus, though meat, bread, and potatoes, are all excellent and nourishing food for man, still the nourishment received from an ounce of meat might be as much as from six ounces of bread, or from twenty of potatoes. And still the potatoes may be the cheaper and more fattening and profitable food, if, to a starving people, forty times as much in quantity can be furnished as of meat, at equal cost. This is the mode in which the value of leaves should be estimated, in comparison with farm-yard and stable manures. And the farmers who commence their use will be disappointed in the results, if they make their cost (in the labor of preparation and application,) equal to that of farm-yard manure, or expect equal effects, from equal quantities.

In applying leaves, and in large quantities, as manure, the first object of the farmer should be to make the mode of application as cheap as possible; and the next, to prevent any of its effects being actually injurious. Neither of these objects are usually attained; and hence the many disappointments in the early practice, and the general relaxing, if not entire cessation of effort in this direction. Such was the result of my own early and very extensive use of leaves; although I did not commit

both these usual errors, but only the one of making the application too laborious and costly to leave any *certain* profit. My erroneous and unprofitable applications were very large; those made on more correct views, and giving satisfactory results, are more recent, and comparatively but small.

In the beginning of the winter of 1832–33, I first commenced the use of leaf-litter on a large scale, and with a view of making it a regular part of the operations of the farm. My land had then been all made calcareous, (by shell-marl,) and the soil, therefore, was then fitted, though incapable of it before, to be profitably enriched by the use of putrescent manures; and the efforts to accumulate them, and the care in saving and applying them, (which had been but small while the marling was going on,) had been extended since a year or two, much beyond my previous habits, or the general careless habits of our country, though still they were very far behind what good and improving farming would require. The offal of the grain crops were all used as food or litter for the farm-teams and a small stock of cattle, and were applied, well or ill, to the crops. My difficulties and doubts as to the best mode of securing the value of manure, and sundry experiments on the heaping and fermentation, were presented in several pieces which were published anonymously in the Farmers' Register, at page 136, vol. 1, and pages 497 and 669, of vol. II. It is enough here to say, that my general mode was to have all the vegetable matters trodden by the stock in the stable and barn-yard; and the only question in applying was, whether fermented or not, or to what extent and in what manner to carry the fermentation of the manure. This was the state of things, when, by heaping the leaves in the woods, my bulk of litter was nearly doubled. For so small a stock of mules and cattle as mine, the offal of the crops had before furnished more than an abundance of litter, for profitable admixture with the animal matter. And by adding as much more, of a still poorer material, there was probably not much value gained merely by the mixture, (or more than the leaves might have had in a separate and cheaper application,) and the whole labor of hauling, in and out, heaping, loading, spreading, and ploughing in, was doubled. The portion of benefit due to the leaves alone could not be separately estimated, or fairly appreciated; and, with all the desire felt to find a favorable result, the whole benefit from the manure was not enough to admit of allowing much profit to have been derived from the leaves. Without being able to make any fair estimate of the whole benefit derived from the winter's manure, and not even to approach an estimate of the leaf portion of it, the result, as to the latter, was altogether discouraging. There was no evidence that the application had paid for the labor.

Another mode of application had also been tried on from 10 to 20 acres. It was evident that the passing all the leaves through the cattle-pens would require more labor in the after-operations than the farm could spare. Therefore, the leaves, as raked up in the woods, in mid-winter, were hauled directly on the land designed for corn, and dropped as thick as they could be ploughed in toterably well, after being spread, by ploughs runing 6 or 7 inches deep. The quantity to the acre is not remembered; nor can I say what the *supposition* was of the benefit derived to the next or any succeeding crop, as I did not reside on the farm; and not long after, my personal attention was almost entirely withdrawn. But this is certain, that there was not enough benefit to promise reward for that mode of applying leaves.

These results were discouraging, and to most persons would have been sufficient proof that leaves were not worth using. But I had been satisfied, from the beginning, that there were great objections to all the methods tried, and that no fair trial could be made, or full value known, until these defects of practice were avoided. A small experiment of what was deemed a better method, helped to strengthen my opinion. Still, the wretched superintendence and consequent bad management of my farm for some years, and latterly the want of spare time, and other labor, have prevented the reducing my plans to practice until last winter, and then not to half the extent that is hoped to be reached in the approaching winter, and henceforward.

The defects, which should be avoided, will first be stated; and to know these defects, it is necessary to recur to the chemical constitution of leaves, in different conditions, and to the established principles of the nutrition of plants. It has already been stated, that nothing can act immediately as food for plants, except it be then soluble in water. Therefore, whether it be of the richest rotten farm-yard manure, or of recently-fallen and unrotted leaves, the only parts that are ready to serve as food for plants is so much of each as can be dissolved in water by being soaked in a sufficient quantity, and for a few hours, or days. The soluble proportion of the rich and rotten manure would be very large; and of unrotted leaves, very small. But small as may be the latter, it is rendered less, if not for the greater part removed and lost, by every heavy and thoroughly soaking rain that falls, and which must dissolve and carry off, or into the earth below, most of the extractive or soluble parts of the leaves so treated. But the wetting promotes decomposition, and consequently, the conversion of insoluble to soluble matter; and whenever another heavy rain falls, there may be again formed as much or more soluble matter as before, to be again dissolved, and again lost. Thus, though it may take five or six years for the leaves of one year's deposite on poor wood-land, to rot entirely, and though, in that time, all the parts may have been successively soluble, and ready to feed plants, still, at any one period the quantity then ready to act was very small, and the value of the whole was made less and less by every successive rain. Leaves which have been two or three years lying on the ground where they fell, and are rotten and much reduced, appear richer, and more like manure, and perhaps may be more fertilizing at the present, than newer leaves. But still the former have already lost, by decomposition, and washing by the rains, half their bulk, and more than half their strength.

According then, to this reasoning, the first error which is generally made in collecting leaves, is to prefer the old to the new, and to be regardless of the lapse of time, and exposure to rains, both of the new and the old leaves.

Some farmers, who regularly collect leaves to litter their stock, and make manure, and who have more wood-land than they need to rake every

year, divide it into several portions, and rake each portion in succession; so as to get as large a proportion as possible of the oldest and most rotten leaves. Their course should be precisely different; and if new leaves enough could be secured, and with equal ease, it would be better to let alone those of previous years, which have been already robbed of the greater part of their fertilizing ingredients. It is not meant that, when raking a piece of wood-land, the lower and older leaves should be left. That would cause much more trouble in the separation, than gain in the difference of quality. But, after having once removed the whole cover of the leaves, it will be more profitable to rake the same land every succeeding year, and thus obtain recent leaves only, rather than to go elsewhere for a thicker and more rotten layer, formed principally of leaves which have been soaked in every rain that has fallen in two or three years. This opinion, however, is deduced entirely from reasoning, and has not been tested by experiment.

If, however, in the absence of proper experiments, any one doubts the great waste of the soluble matter of leaves, let him take some that have recently fallen, and are quite dry, and soak them for 12 hours in a vessel of water; and the color given to the water, alone, will show that there is much loss, in that short time. Every heavy, or long-continued rain, has fully as much effect on all the dead leaves then exposed. The much greater part of this matter extracted by infusion, sinks immediately into the earth below, and is not seen, and, therefore, cannot be appreciated. But, on poor soils, (or all very deficient in calcareous matter,) after heavy and continued rains, the puddles and streams of water are all more or less deeply tinged with the brown-colored extract from the leaves; and the permanent streams, mill-ponds, and even lakes and rivers formed of water flowing from such lands, are always so colored. Such examples are numerous in lower Virginia, wherever the lands are naturally poor, and there is no calcareous matter in the soil over which the water passes. No such coloring matter remains in the water on calcareous strata, or on good natural soils, the goodness of which is evidence of lime being contained. In such cases, the vegetable extract is seized on by, and combines with, the lime, or the soil containing lime, and is saved for fertilizing use, if the soil is in a state fit to produce any valuable crop. But, if the land on which the colored water flows, or stands (in ponds) or sinks into, has not the natural constitution to enable it to attract, and chemically combine with, vegetable extractive matters, or vegetable manures, then this kind of food for plants will not be retained, nor be profitable to be applied thereto, any more than other putrescent manures on the most ungrateful soils. The propriety and profit of applying leaves, as of every other putrescent manure, of course depends on the fitness of the soil to receive such benefit. This is not the place to set forth the causes of such different qualities of soils, (and which has been done elsewhere,) and in all the remarks on the benefit of applying leaves as manure, it is understood to be on soils which would return good profit for the use of other vegetable manures.*

* See Essay on Calcareous Manures, second edition, chap. 2, 3, and 8.

If the opinions expressed above are correct, the proper practice in collecting leaves, and one totally different from the common mode, may be readily inferred. Those who collect leaves for manure, seldom rake up and heap any soon after they have fallen, and before they have been soaked by many successive rains. The raking is most generally done at leisure times, in the latter part of winter and in spring, and is sometimes continued through summer and autumn, to nearly a year after the newest of the leaves have been lying on the earth, soaked by rains, and wasting continually. If this litter, so used, is found highly advantageous by improving and judicious farmers, (of which there can be no doubt,) it is even more certain that their profits from it would be much greater, if the collection and application were made without permitting such waste previously to take place.

The raking up and heaping of the leaves, in the woods, ought to be effected as soon as possible after nearly all have fallen in the early part of winter. The work is done much the easier if the leaves are wet; and therefore a slight or slow rain, just before, is desirable. Even a single heavy rain, if not continuing very long, may assist the collecting and removal of the leaves, more than it will diminish their soluble and enriching parts. Besides, by being put up wet, decomposition will proceed in the heaps; but if heaped dry, and especially if principally of oak (or any other than pine) leaves, the upper part of each heap, forms a thatch almost impervious to rain, and the interior of the heap may remain dry and unchanged for a year. Every effort should be made to have the leaves raked up, and put into good stout heaps, as early as possible after the proper time. But after being heaped, and secured from the wind by a few hoefuls of earth, they will lose little or nothing by waiting months, or perhaps even a year, for a convenient time to be carted away and spread on the fields.

The poorest lands, when not annually raked, yield the greatest bulk of leaves; because the acidity of such soil retards the rotting so much that the leaves of five or six years may be on the surface at one time. On calcareous and rich soils, there being not only no acid, but also a strong chemical action or attraction between the soil and any vegetable matter in contact, the leaves soon disappear, if not raked up and heaped. On a small piece of wood-land, of soil both calcareous and very rich, I had the leaves raked into heaps during winter; and when hauled away the next autumn, the heaps were well rotted, and as "short" and as black as old fermented and dry farm-yard manure. Heaps made about the same time on the poor huckleberry ridge forest lands, in the same space of time were but little altered.

The greater proportion of pine there is in the forest growth, the more valuable the cover of leaves; and of course the old worn-out lands, bearing a second growth of unmixed pine, are the best to furnish this manure. There is more of substance and weight in the same bulk; the pine leaves are more easily handled in every process; and from their narrow and compact form, they oppose no impediment to the young spires of any crop on which they may be laid, and for the same reason they are not liable to be carried off by the winds. Farmers more experienced than myself in their use, and whose opinions are therefore of

more worth, also believe that pine leaves are richer, than those of the other usual forest growth, whether comparing weight of litter, or the spaces of ground furnishing the different kinds of leaves.

The next greatest error in leaf-manuring upon a large scale, is passing more of the leaves through the farm-yard, or stable, than are needed for plentiful litter to the animals, and as a vegetable material to absorb and mix with the richer animal matters. When so poor and so slowly putrescent a substance as new or dry leaves are used as litter, and in very great quantities compared to the richer ingredients of the whole mass, the manure will not be fit to use profitably for corn, or other spring crops, without its being heaped, and more or less fermented and reduced. This labor, and this source of loss, would be a serious matter, besides the having double handling and hauling of the leaves, before applying them to the land.

If, to avoid the heavy cost of twice loading and twice carting of many hundreds of loads of leaves, they are taken at once to the field, and spread and ploughed under, unmixed and unrotted, then another great loss will be sustained, in the trouble of ploughing under, and afterwards among, such a cover of unrotted litter, and the early unfitness of the leaves to nourish or help the growing crop, even if it does it no positive harm (as would seem very likely) in a dry summer. If left to choose between these several modes of application, it would be difficult to decide in favor of either; and it may well be doubted whether either, on a large scale, and requiring much of the regular labor of a farm, would be of much profit. But judging from reason, more than from my yet but small experience, it still seems manifest that all farmers who can easily obtain leaves, in great quantity, and will put them on soils fit to receive improvement, and on a different method from any of those above described, may thereby improve their land and their profits, greatly and cheaply. My proposed plan is the following:

1st. To make and heap as much leaf-litter, in the woods, as the demand for other farm labors may permit, early in the winter; and the balance afterwards, as soon as convenient, and at leisure times. The leaves to be heaped when moist, in preference, and the heaps to be kept safe from wind, by having thrown on them a few sods of huckleberry roots, or a few hoefuls of earth.

2d. To use as litter for stock no more than is required; and to cart, as convenient, up to the time of next harvest, the leaves on the land, to be immediately spread, as top-dressing. The principal application, through winter, especially of the litter composed wholly or mostly of pine leaves, to be on the growing wheat; and in the spring and early part of summer, on young clover sown the season previous. When not convenient on either, the leaves might be spread on any land in natural grass, or weeds, and not intended to be ploughed until the next year, and not to be grazed.

It will be obvious at once, that whether much or little improvement is found from this mode of application, that it will be at but little cost of labor. There is no double loading and carting—no labor or loss in heaping and fermenting—no ploughing under or among the leaves while unrotted—and no possible injury to a growing crop. And if it is beneficial to top-dress young wheat with other vegetable manures, and young clover and other grass with dry and unrotted straw, as well as farm-yard manure, (both of which I highly approve, and have practised as largely as convenient for several years,) then there can be no ground to question the soundness of my conclusion, that whatever value there may be contained in the leaves will be given in this manner most completely, as well as by far the most cheaply.

My earliest trial of top-dressing young wheat with fresh and dry leaves was in the beginning of the winter of '33–4, and was made soon after the wheat had come up. If it could be done at so busy a time, it would be much better before the coming up of the wheat; as it would be less troublesome, and less liable to injure plants by the carting. Pine leaves were used, as others would have been blown off by the dry March winds; and they were necessarily put thinly, to avoid smothering the wheat. The quantity to the acre is not known more accurately. As was expected, the slight cover of leaves served evidently to protect the young plants from the severity of the cold weather in winter; and from this mere mechanical effect, (which is independent of and distinct from any alimentary or enriching matter furnished by the leaves,) there was a very perceptible, though but slight benefit exhibited by the top-dressed wheat, before any could have been supposed to be produced by the leaves as manure. A slight superiority continued plainly to be seen until the growth was well advanced, which was as late as it was observed.

It is admitted that this improvement of the crop was but small; but the cost of the dressing was also very small; and the mechanical part of the benefit, (which was probably all that was derived by that first crop,) must be certain in every winter, and might sometimes save a crop that would otherwise be killed by the severity of the cold. If clover is sown on the wheat, that also would have the same mechanical protection, both from late cold spells, and from the heat of the following summer. My later practice of this year, as will be stated below, has shown this particular and very important benefit in a striking manner.

The slower fertilizing action of unrotted leaves applied as top-dressing to clover, or other crops, will be less evident or perceptible than the mechanical. Upon my own recent and only judicious applications, there has not yet been enough lapse of time for the best effects to show. I do not pretend, therefore, to estimate what may be the full benefit derived from a certain amount of leaves laid upon a certain space of ground, nor to affirm whether much, or but little increase of fertility will be thereby produced. But having full confidence in the propriety of using dry straw and other more putrescent manure as top-dressing, in preference to ploughing under, and on young clover, in preference to grain crops, I have equal confidence in that mode of applying leaves, to profit by their full value, whatever that value may be.

It was not until last winter that the state of my farm, in other respects, made it convenient for me to resume collecting and applying leaves, to any considerable extent, and entirely upon the surface—the former modes being deemed of no certain advantage, above the value of the labor employed. The want of sufficient spare team-labor still caused the quantity applied to be much less than will be applied annually hereafter, if there is

no disappointment found in the effects produced. The general results of the last applications have, so far, been highly gratifying. Particular effects, which were more carefully observed and noted, will be stated in the report of my manager below. The early benefit which he reports on the wheat, and striking later benefit to clover and weeds, the *apparent* destruction of wire-grass, covered by the top-dressing of leaves, laid on as brought from the woods, I observed myself, at different times of hasty and widely separated visits to the farm. But as there was much that is more of general statement, which I did not myself see, in the progress of the experiments, and there is much more that can neither be properly appreciated or described except by the person who has observed them throughout, it was deemed preferable that the report should be made by the manager himself, and upon his own responsibility. I therefore requested a particular and accurate report of the facts observed, and which had been mostly noted before, for publication, and which is as follows.

"*Coggin's Point, 7th Sept.*, 1838.

"In obedience to your instructions, I hereby forward to you a statement of the results of the experiments made, agreeably to your directions, of pine and other leaves, applied as top-dressing to young wheat and clover.

"The leaves were collected into heaps as early as possible after falling from the trees. The pine leaves were hauled and put on the nearest portions of our young wheat, in the months of January and February, when the ground was sufficiently frozen to admit of the teams travelling on the wheat without injury, and applied at the rate of from twenty to twenty-three loads per acre, (in carts of 118 cubic feet, and that would contain nearly one hundred bushels,) and were scattered over the wheat as evenly as possible. The benefits resulting to the wheat from this top-dressing, were very apparent soon after the application, and by the 18th of March were strikingly obvious; and from then being some inches taller, and of a deeper green color, than the general crop not so top-dressed, the ground could be easily discerned at a considerable distance. A person standing on one side of a piece of ground so top-dressed, could distinctly trace the exact outlines to where the leaves were applied. The wheat so top-dressed maintained this decided superiority throughout the whole of its growth, and continued very obvious at a distance until the wheat came into ear; but notwithstanding its superiority in every other respect, it was about eight days later in flowering than the adjoining wheat not so top-dressed. The difference in ripening however was not more than four days. On reaping the wheat, the straw was evidently much taller and stronger, than that of the adjoining wheat, the heads appeared to me as being larger, and the grains of a larger and plumper appearance. In this latter respect, it is, however, difficult to form a correct estimate, though as far as I could judge, I am warranted in saying, that the grain did not derive less benefit than did the bulk of straw. The leaves were not applied on one continued portion of the field, but on four different and detached places, and on each with the same very obvious benefits; consequently these benefits are wholly attributable to the covering of leaves, and not to any difference in soil or situation. Nor did these very apparent benefits terminate with the wheat crop; for in this unprecedentedly dry season, when a very large proportion of our clover, sown amongst wheat last spring, is destroyed by the excessive and long-continued drought, the clover on those places top-dressed with leaves looks well, is apparently little injured, and the difference in the greater growth of the clover and cover of weeds, make these spots even now, more obvious than at any period during the growth of the wheat.

"There is one circumstance connected with the above, that I consider worthy of notice. The leaves (altogether of pine) covering the wheat in one place, were extended over a portion of ground much infested with wire-grass. At this time, the ground thus covered with leaves presents a very scanty growth of this pest, while on the adjoining ground there is a very close cover of it. This difference is so evident as to be distinguishable from a considerable distance; and, when closely examined, is found to follow all the little departures from a straight line made in scattering the leaves.

"For a top-dressing to young clover, leaves of every description, convenient to the field, were collected and also applied in the months of January and February, when the ground was suitable for hauling on, at the rate of 32 loads to the acre, (in carts of the same capacity as stated above;) but as it was difficult to have all of the loads equally large, occasional additional loads were necessary, and probably 35 loads were given to the acre. The benefits resulting from this application, were soon very apparent in the earlier and better growth of the clover, though I now consider the covering as having been rather heavy. Adjoining to this was a portion of clover covered in the preceding September with straw. That covered with leaves made an earlier start, and maintained a better appearance than that covered with straw, until after the beginning of May, when the latter evidently gained the superiority, which it maintained throughout the season. The benefits, however, resulting from the application of the leaves, are up to the present time very apparent; both the clover and growth of weeds being better than on adjoining ground which had a liberal top-dressing of farm-pen manure (but of course very light compared to the bulk of leaves) in April and beginning of May.

"In connexion with the above experiments, permit me also to state what has been the result of applying unrotted straw as a top-dressing to young clover early in the fall. In the months of August and September, 1837, all of our wheat straw with the exception of a limited supply left for littering stables, &c., was hauled out and spread on young clover. The clover evidently derived much and early benefit from this covering of straw; and, with a small exception, was the only clover on the farm this season (1838) really worth mowing, which was done for green feeding; and this was the only portion of our clover from which a second cutting could have been obtained, it having longest withstood the effects of the drought. This season I had 126 loads of straw hauled out, as return loads, when hauling in wheat to the thrashing machine, between the 12th and 18th of July, and spread the loads as soon after as an opportunity offered, on young clover. This early, though small application, has proved very beneficial to the clover during the scorching weather that has since occurred. After finishing wheat-thrashing, all our straw (with the exception of a small portion for litter) was hauled out together with the chaff, summer-made manure, &c., and also spread on the young clover; and though only finished so lately as the end of August, there is already a very perceptible improvement in the growth of clover, grass and weeds, compared to that which has not had the benefit of a top-dressing.

"Having simply stated the results, so far as my observation has led me, I leave you to draw the evident inferences, merely remarking that I consider from the result of these experiments, that pine leaves, when they can be got conveniently, as being even a preferable top-dressing, for wheat, to rotted farm-pen manure. What they may want in fertilizing matter, they more than compensate by the warmth and shelter they afford to the young plants both of wheat and clover;

and I would recommend a continuance of the practice, so far as practicable. The practice of applying unrotted straw is, in my opinion, the preferable and most economical mode of applying it, particularly if on young clover. There is only one objection to the practice, which is, that seeds of spelt, &c., are thus applied to the soil in a state favorable to their vegetating. The cutting of the clover in the proper season, and consequently of these foul weeds before they get into seed, would, however, remove this objection. ANDREW NICOL."

It may seem contradictory, as well as strange, that the ripening of the wheat should be retarded by the top-dressing of leaves, which so manifestly forwarded its early growth, and improved the product. But these opposite effects are easy to account for. The leaves not only sheltered the ground from the extremes of cold in winter, but also, in some measure, from heat and drought in summer. Thus, the mechanical effect is to give the benefit of a cooler summer climate—which, to our wheat crop, especially, would be a great benefit. It is known to others, as well as to myself, that Irish potatoes, made without tillage, under a very thick coat of leaves, are of a very superior quality, (as well as in good quantity,) and more like those grown in northern and moist countries, than such as we usually make on ground not thus covered. This thick cover preserves moisture, as well as shade and cooler temperature.

It may be necessary to add, in explanation, that all the parts of the practices referred to, or described in the foregoing statement, were not considered judicious, but were compelled at the time, to avoid still greater loss. For example—though an advocate for top-dressing in general, I do not extend the approval to putting out barn-yard and stable manure as top-dressing in the latter part of summer. Top-dressing with manures so putrescent as to be soon ready to act, (as those from the stable and barn-yard,) ought to be given to a crop then growing, and ready to consume the food furnished by the decomposing manure; and all top-dressings should, if possible, be applied to a crop in its young state and early in the growing season, that it may have the longest time to derive benefit therefrom. Leaves, therefore, should be also applied to clover early; and for an additional reason, viz: that its growth may cover the top-dressing in a short time, and thereby not only protect the leaves from being moved by the winds, but, by keeping them shaded and moist, forward their decomposition, and convert them to food as soon as possible. Of course, it is an essential part of this plan of top-dressing that the growth of clover shall not be taken off, by grazing or mowing, until the previous top-dressing is decomposed by the aid of its shelter and shade. The process designed, is, first to make the leaves, (or any other top-dressing,) to manure and feed the clover—and the next, to make this crop of clover, (turned in green or dry,) manure the succeeding crop of wheat or corn.

No apology will be offered for presenting these theoretical views, sustained, as yet, by so little practical experience. The main object of the communication is to elicit, from other persons, who are much more experienced, and, therefore, much better qualified to instruct, their more practical views, and more profitable results. There are many intelligent and improving farmers among the readers of the Register, who are reported to be successful manurers with leaves on a large scale; and it is earnestly desired by the writer, that such farmers will give to the public, through this journal, at length, their more extended practice, and more valuable opinions. It will be gratifying to the writer of these observations, to aid thus indirectly, if in no other manner, in causing light to be shed on this important subject, even though it should be accompanied by the showing his own views and practice to be erroneous.

EDM. RUFFIN.

DIRECTIONS FOR THE MANAGEMENT OF SILK-WORMS THROUGH THEIR HATCHING AND FEEDING TIME, ACCORDING TO THE MOST APPROVED EUROPEAN PRACTICE.

Translated from the French, for the Farmers' Register,

BY THE EDITOR.

Translator's Introduction.

It is now more than ten years since silk-culture was proposed as a new and profitable direction for a part of the agricultural labor of the United States; and for sixty years, silk has been made, upon a small scale, and with satisfactory profits, in a part of Connecticut. In the last few years, many adventurers have embarked in this new business, in the northern states, or have made preparations for commencing. The successful and known results however, have fallen far short of the expectations excited by the first promises of profit, and the loud notes of preparation for silk culture. Some of the causes of such results, have been stated at length in an article in the last number of the Farmers' Register, (commencing at page 389, volume VI.) It is sufficient here to state the general fact, that the business of selling the multicaulis mulberry plants, offered so much greater profits than feeding the leaves to silk-worms, that the former business has superseded the latter, for the present, and may continue to do so for a year or two to come; and thus, in providing the *means*, the *end* designed seems to be forgotten.

The recent introduction of the most valuable variety of mulberry, the morus multicaulis, will so much lessen the labors of silk-culture, that it may correctly and properly have the effect of extending the business, far beyond its otherwise proper and profitable limits. The actual demand for the plants of this variety, has recently produced a speculating mania, which has enormously enhanced the market value of all the stock now growing in the country; and this fictitious demand, for speculation, and its feverish and improper excitement, are spreading rapidly over all the southern and middle, as well as the northern states where it commenced, and to which, though the least favorable region of our country, schemes of silk-culture had been before almost exclusively confined.

The first effect of this speculating mania, will be to cause a large amount of money to be made by some purchasers, and perhaps much to be lost by others. The mere cultivator of the plants, in no case has yet lost any thing, nor can he lose by the mad speculations of others, or by any decline of prices, unless in suffering disappointment of his own too highly excited

hopes of enormous profits. The next, and a very beneficial effect of this mania, will be to spread the multicaulis plants, or cuttings, to every part of the United States; and so great is the facility, certainty, and rapidity of propagation, that wherever a single twig is planted, its increase may, in a few years, serve to feed a great number of silk-worms. The violent fever of excitement, produced by this speculation, is also causing the silk business to attract general attention through the whole country, and of thousands of individual farmers who could not have been stimulated to attempt a new and untried pursuit, by merely the more moderate, even though sure profits, of silk-culture proper. This will operate as an immense benefit to all the country fit for this business; and especially for Virginia and the adjoining slave-holding states, whose circumstances are such as to offer double the profits that can be obtained from rearing silk-worms in the northern states.

We do not pretend to estimate, nor even to have any correct idea of, the profits to be derived from making silk. Those who are willing to trust to such conjectural estimates, may find them in sundry publications issued in the states north of Virginia. But without discussing the claims of any such estimates to be trusted, and without deciding whether the net profit may be $300 per acre, (which some estimates make out,) or the tenth of that amount, (which might satisfy most cultivators here,)—of *this conclusion* we are perfectly sure, THAT WHATEVER MAY BE THE PROFIT OF SILK-CULTURE NORTH OF PHILADELPHIA, MUCH MORE PROFIT MAY BE OBTAINED IN VIRGINIA. And the grounds from which this conclusion is deduced are such as will scarcely be denied, or questioned. They have frequently been stated in editorial articles in the Farmers' Register, and therefore will now merely be briefly repeated.

The first superior advantage possessed by Virginia, is in the warmer climate, which is more suitable to the silk-worms, and far more suitable to the early, long-continued, and luxuriant growth of the mulberry trees, and especially the multicaulis mulberry, which greatly prefers our southern climate.

Secondly, millions of acres of land, worn down by tillage, but still very suitable for bearing mulberry trees, (and which would necessarily be improved by the general system of silk-culture,) may be devoted to this growth; which land is worth nothing to the proprietors, and would not sell for more than $2 to $4 the acre. Yet land, equally poor and unproductive, at first, in New England, if obtained for this purpose, would scarcely cost less than $20 the acre; perhaps, a much larger amount.

Thirdly, the labor required for feeding silk-worms, (which is elsewhere one of the most important parts of the expense,) would cost very little on most farms in Virginia. There are very few farms, on which there are not some slaves who are too young, or too old, or otherwise too infirm, for any common labor, and who, therefore, do nothing, and are a dead expense in their maintenance. These, now worthless and expensive consumers, would be precisely suited, and perfectly competent, to perform all the labors of a silk establishment, under the direction of an intelligent and careful conductor, male or female. Indeed, in many cases, without any hired supervisor, a farmer's industrious wife, with her before useless slaves, might make a crop of cocoons that would sell for half as much money as her husband's surplus grain crop.

Either of these three advantages over northern silk-culture is very great; and, all combined, can scarcely be less than equal to the production of a double net profit. But it must not be forgotten, that to insure this (or even any) profit, there must be applied to these superior advantages, the enterprise, industry, watchfulness, and perseverance, which our northern brethren exercise in all their undertakings and employments, and which requisites for success are generally and deplorably wanting in the southern states.

Entertaining these opinions, we earnestly hope that the now prevailing trading demand for multicaulis mulberry plants, and mania for speculation, may have the good effect of establishing silk-culture, as well as mulberry culture, in the south; and that the solid and certain, though moderate profits of the business, may not be scorned and rejected, as soon as the sales of multicaulis plants come down to a fair price, or cease entirely for want of buyers.

In urging the landholders of Virginia to commence silk-culture, we do not use, as an inducement, the very general statement of its advocates in this country, that the business "is very simple, easy, and requires very little trouble and no particular system." Such is not our opinion. It is a branch of industry promising large returns for a sufficient outlay of care and labor, as well as expense in arrangement and fixtures; but promising nothing to neglectful, careless, and indolent management. It is important, therefore, to the public interest, as well as to that of the individual adventurers in this new and untried direction of industry in Virginia, that there should be as little risk as possible of disappointment and loss, caused by ignorance, and, consequently, the omission of the cares essential to success. Whosoever may commence this business under the belief that it requires no particular procedure, and not much care or trouble, and shall act accordingly, will probably lose his trouble and expense, as little as they may be. But he who takes the opposite view, that much trouble and unremitting attention are absolutely necessary, and is resolved to bestow all that is requisite, will probably have less trouble, in the end, than the most careless conductors, and will reap as much profit as the others will find of loss. It is to guard against this very general error, and to direct new beginners to a course of proper and profitable procedure, that has induced the translation of the treatise which will follow these introductory remarks.

In the several treatises on the rearing and management of silk-worms, which have already been written and published in this country, as well as in the more numerous shorter articles on the same subject, which have appeared in periodical papers, there appears, in one important respect, a general similarity between them, and a marked difference from all known foreign works of high authority. In the latter, the method directed for raising silk-worms, is to preserve, with great care, certain degrees of temperature, with as

little variation as possible from the different grades required at different times; and to give food in certain quantities, according to the age and condition of the silk-worms. To be able to command the former object, it is necessary to raise the heat of the laboratory above the average degree of the external air; and to regulate it, by means of fires in stoves or chimneys to raise the heat, and by ventilators, to lower it; and by thermometers to measure and direct the temperature according to fixed rules, which have been established by careful scientific investigation, and long practical experience. All this array of means, even though it may finally conduce to economizing of labor, and to increase the net profits, in a regular and established business, is alarming to new beginners, or experimenters, who are unprovided with any such means for a fully and properly established business; and they have, without exception, readily yielded their assent, and conformed their practice, (so far as there has been any practice,) to the very opposite opinions and directions of those who have written in the United States. These writers concur in the opinion, that the precise rules, and artificial and regulated temperature, of the European method, are altogether unnecessary; that the raising of silk-worms is a very simple operation, and may be done successfully without any particular fixtures, system, or rules, if merely enough of proper food is supplied, and the worms are kept clean enough, and not too much crowded during their growth. Whether it is that these instructions are so reasonable as to carry conviction with them, or that they are more suitable to the natural indolence of men, and their disposition to avoid labor and expense as much as possible in every new undertaking, the result has been, that all who have commenced to raise silk-worms in this country, have adopted, upon the advice of American writers, this more *natural method*, as it may be termed, in contradistinction to the highly *artificial method* of European authorities—scientific investigators, as well as successful practical culturists.

In the reported results of the experimenters and older culturists in this country, so far as they can be gathered from the very limited and imperfect published statements, the returns are said to be satisfactory, and the *prospects* of future success and profit very flattering. But it also often appears, from indirect testimony stated at first, or from making further inquiry, that there were also some heavy deductions from profit suffered in one or more of such occurrences as the worms suffering from excess of heat, cold, or damp weather—of their supplies of food being irregular, and sometimes deficient, sometimes in excess—of irregular progress in their growth, and the whole time being more or less protracted; and from all of such causes, there having resulted great increase of labor and expense in the management, diseases produced and great mortality of worms, and the crop of cocoons, in quantity and quality, being very far below a proper return. If, notwithstanding all these losses, a fair net profit is made, (compared to other branches of agriculture,) or even a fair promise of future profit is in prospect, when the worst first errors shall have been avoided, it is deemed by the culturists as sufficient evidence of the superiority of the simple and natural, over the artificial method.

In this very general opinion, held in this country, by both writers and practical culturists, we cannot, as yet, concur. Our practical experience in rearing silk-worms, it is true, has been limited to a very small experiment; and, therefore, it would be presumptuous either to condemn or approve, without reservation, any practices of which it is admitted we are practically ignorant. But reasoning from all the known facts and circumstances, and in the absence of any certain and accurately reported cases of success in rearing worms on a large scale upon the more natural method, we hold to the opinion, that the method of regular and artificial temperature is not only productive of the greatest gross products from a certain quantity of eggs and of food, but is also the safest and the cheapest. And yet, while presuming thus to object to opinions so generally, if not universally, received in this country, we feel some distrust of our course, not only upon the admitted ground of want of practical experience, but, still more, because of the contrary opinion of the few individuals in this country, whose opinions on this subject deserve much respect. Among the highest, we would place the author of the 'Treatise on Silk Culture,' which was commenced in the last number of this journal, and of which the continuation will be furnished by the author as soon as his engagements may permit. But though willing to pay the utmost respect to opposite views from such sources, and ready to yield to good reasons and proofs, whenever they are brought forward, until so convinced, we shall still maintain the superiority of the method of artificially regulated temperature, and weighed and regulated allowances of food. The reasons for this preference will be concisely stated.

It is affirmed by scientific, intelligent, and also practical silk culturists of Europe, that certain degrees of temperature are most proper for silk-worms in each of their various stages and conditions of life; and that sudden and frequent changes of temperature, even though but of a few degrees, (or much less than occur in the natural temperature of every 24 hours,) is hurtful to their appetite, health, and future product. It is also affirmed, (and that will scarcely be denied by any practical culturist, or even new experimenter,) that equality of temperature, and of other treatment, is necessary to produce equality and uniformity in the successive changes of condition (or "ages") of the worms, and of the duration of their lives; and the inference is inevitable, that, if such uniformity and regularity is totally wanting, the trouble of management will be greatly increased, even if no other evil were to be feared. It is also a settled matter among the highest authorities in Europe, that in every age and successive change of condition of the worms produced from a certain weight of eggs, a certain quantity of food is required, and that they would suffer by any material diminution; and any excess would cause a waste of leaves, be additional trouble in clearing away the litter, and annoyance and injury to the worms by the previous accumulation. Hence must

be inferred, not only the benefit and expediency, but the *economy*, both in labor and expense, of knowing how much food is necessary, and furnishing, by careful selection and weighing, that precise allowance for every day, and sometimes for every meal.

It may well be, notwithstanding all the long-continued and laborious investigations of Dandolo, Bonafoux, and other scientific culturists, that the most perfect rules of treatment may not yet have been discovered. Indeed, improvements in this, as in other arts, are made every year, and we entertain no doubt but that the inventive faculties and enterprise of Americans will soon produce as much improvement in silk-culture, as in other old arts, derived from other countries. But still, the principle of the European method will not be the less true, nor less important to be observed in every laboratory, viz. that certain degrees of temperature, and certain quantities of food, are best for each of the various successive conditions of the silk-worms. And if this principle is correct, it cannot be proper or safe to leave the degrees of temperature to be regulated by the chances of the varying seasons; and the proportions of food by guessing, or even by weighing, without knowing the wants of the worms at any particular time.

It is not only the scientific silk-culturists of Italy and France, who, in modern days, have maintained the necessity for the artificial method of heating. The like opinion has obtained in China, the natural region of the silk-worm; and the like end has been reached, (though by very different, and far less perfect means,) in the practices which perhaps have prevailed in that country for thousands of years. In the extracts from the curious old Chinese work, published in the Farmers' Register, it will be seen that artificial, and carefully regulated heat, is directed to be maintained throughout the rearing; and though without thermometers, other means are used to estimate, and thereby direct, the allowance of heat. (See page 232, vol. VI, Farmers' Register.)

If the European rules are not absolutely false—if obedience to them is in truth more beneficial than the natural, simple, or chance-directed methods of rearing silk-worms—there can' be little doubt but that, to pursue these, or other proper rules, strictly and carefully, it will be found economical, in labor of attendance, in quantity of food, in the good condition, and more rapid maturity of the worms, in greater security against loss by diseases and deaths, and in the products of all that may live to form cocoons.

But because approving of a very regular system in a large and established silk business, it is not meant that such regularity, or even any particular means. or rules, are necessary to make first experiments, and to meet with great success in the management of a small number of worms. No one need wait to construct a proper cocoonery, or to use any artificial temperature, to raise a few thousand worms. There will be waste of labor in attendance, because of the want of systematic procedure—there will be a waste in the excess of food given—and there may be a protracted or too rapid feeding time. But the worms, by having plenty of room, and plenty of food, may be able to withstand the hurtful variations of temperature, and may produce better cocoons than the average of regular and large establishments. First attempts in feeding silkworms ought always to be on a small scale; and in such, it is of very little importance whether the cost be greater than is necessary, or not, provided the new culturist learns what is proper for future and larger operations. Therefore, we would advise all who desire to make silk, to begin as soon as they can command enough of any eatable mulberry leaves for food, and without any expensive apparatus or regular and exact system; but to conform to a proper system, by the time their business becomes established, and upon a much larger scale.

Under the impressions stated above, we have thought that, in the present general interest felt on the subject, it would be an acceptable service to the agricultural public, to furnish a correct translation from one of the latest European treatises, which may be supposed to contain the received opinions of the culturists of the highest authority, up to the time of the publication. For this purpose, we have chosen Morins' "*Manuel de l'art d'élever et de soigner les vers-a-soie*," etc., published in Paris, 1828; and have translated the portion which directs the whole treatment, from the first preparation for hatching the eggs, to the end of feeding the worms, when they are ready to climb, and to spin the cocoons. So far as given, the text of the author has been rendered fully and almost literally; as we are not of the opinion that a translator has any right to take any thing from, or add to, the argument, unless when fully showing the fact and its extent, and the cause of the privilege taken. Many parts of the directions are, perhaps, unnecessarily minute, and others (especially in regard to the first preparations for hatching the eggs,) may be totally useless. Of these the reader can judge what is, or is not, useful; taking care to secure the only important object, which is to have all the eggs to hatch together, and at the proper time, and to know the precise quantity hatched.

The portion of the work which treats of the various kinds of mulberry trees, and their culture, has been omitted entirely, because the more recent introduction and rapid extension of the culture of the more valuable *morus multicaulis*, or Chinese mulberry, will nearly supersede all other and older kinds in this country. Also, the portion of the original work which directs the formation of the "hedge," or shelter for the worms when spinning their cocoons, has not been given, because better modes have already been discovered in this country, which, as well as a plan of a good laboratory, will be particularly described in a future article. This translation therefore embraces only the entire hatching and feeding time.

It was not until after this translation had been written, that we obtained the first sight of the manual of silk culture, prepared under the direction of the secretary of the treasury, by order of the House of Representatives, and published in 1828 (Document 158.) It was manifest, upon examination, that our French author, Morin, and the translator, compiler, or author of the manual prepared by direction of our go-

vernment, drew their instructions for the hatching and feeding, though through different channels, from the same remote source, and the highest authority, Dandolo's work. Of course there is a general similarity, and often indeed identity of substance in the descriptions and directions, as must be expected in any different treatises drawn principally, however circuitously and remotely, from a common source. Still, there are imperfections of form, and manifest errors of version, (in mistakes of the author's meaning,) so great and so important, in the manual published by order of the government, that we had no reason to consider our own labor as thereby rendered useless, or superseded by the prior, though unknown, work of another, who is compiler and author, as well as translator. This combination of characters is the first and great objection to the treatise in question; for though it is manifest that the writer is generally merely a very free translator, from a work of very high authority, yet he often intermixes the instructions or statements of others, and often his own, without distinguishing between them. It follows, that the reader is left to guess, from the context, whether he is receiving instruction upon the high authority of Dandolo, the perhaps questionable authority of others, or from the American writer of the document, whose authority on practical silk culture, like our own, deserves no respect whatever.

The French work from which this translation is made, is one of a number of manuals, upon almost every useful science and art, which, though so many separate treatises, when taken together form the '*Libraire Encyclopédique.*' This general and extensive work was prepared by the combined labors of a number of scientific and literary men, and upon much the same general plan as was conducted the 'Library of Useful Knowledge' in England. It may be inferred of any one of the separate "*Manuels*" which have recently been published under this plan in France, that it presents the latest and most correct information, and what is there received as the best system of instruction in the art of which it treats. This inference was our ground for supposing that this treatise would furnish such instructions as are deemed correct by the best silk culturists of the present time in Italy and France, or those regions of Europe, where the art of rearing silk-worms has been investigated with the most careful and scientific labor, and where the practical results have been the most profitable, and the products the most abundant.—Ed. Far. Reg.

CHAPTER I.

Of the hatching of the silk-worms' eggs.

Among the preliminaries to be observed in the disposition necessary to make for the hatching the eggs, after having detached them from the cloth or paper upon which they have been preserved since they were laid, the most important is to submit them to a temperature a little raised; as much for obtaining them vigorous, and to preserve them capable of fulfilling the end proposed, as to make them hatch altogether. It has not been very long since, for this purpose, recourse was had to the heat of dunghills, of beds, of kitchens and other places; now they construct hot-houses, or warm green-houses, precisely like those which gardeners use for obtaining flowers in winter. From the moment at which the eggs are exposed to this heat, they undergo, all together, the same conditions; and, whatever may be their number, they almost all reach the end desired in the same time. It is necessary, however, to bring to bear unremitting care and attention, and great watchfulness; for without these, the whole brood would be injured or destroyed. Supposing then, that the operator is provided with thermometers, hatching stoves, &c., as will be hereafter described, we will now proceed to speak of the hatching of the worms.

1. To prepare the eggs to hatch, it is of great importance that they should have been well fecundated, and, above all, well preserved, in the climates of France, to the latter part of April, or first days of May. The cloths, to which the eggs are attached, are plunged into common water, and suffered to remain six minutes, that the mucilaginous matter, by which the eggs adhere, may be dissolved. The water is then suffered to be drained from the cloths, for ten minutes, and the eggs are then carefully scraped off with a suitable instrument, [such as an ivory paper-folder, or a spatula,] which may be done with much facility. The eggs are collected, for the purpose of pouring them off successively, and until none are left upon the cloths. We may, in any kind of vessel, do it in half an hour. Before separating the eggs, there is poured over them a little water, which serves to wash them. All which swim on the water are thrown away. For this operation five minutes are sufficient. It has been noticed that eggs which had been laid in a cold and moist temperature, and are yellow, [the mark of not being fecundated,) yet are heavy enough to sink in the water to the bottom of the vessel. All are next poured upon a sieve, or rather upon a thin muslin cloth, to separate the eggs from the water. The eggs are then put into weak wine, either red or white. Some persons afterwards wash them again in another water, and that causes no marked difference; but prudence requires that the eggs should not be left too long in the wine, because it hardens them very much, which retards their hatching. They should be withdrawn from the wine after ten minutes. The temptation of gain alone has induced the dealers in eggs to dip them in high-colored wine, by which the eggs all acquire the color natural to those well fecundated, even when they are worth nothing. This fraud it is necessary for buyers to be guarded against. Whilst in the wine, the eggs should be separated from each other, by being softly rubbed, then stirred, shaken, and poured out with a certain degree of quickness, by which the heaviest, which are all excellent, are easily separated from the light and unfruitful. The wine is separated and the eggs spread upon new dry cloths, until they are completely dried, which requires forty-eight hours. They are then kept in earthen or porcelain plates, in beds of six to eight lines* of thickness, until it is

* The weights and measures stated in this translation are French, and both exceed the American in about the same proportion. Six French feet are equal to six feet and four inches American measure. The French foot, like the American or English, is divided into 12 inches, and the inch into 12 lines. Seven

desired to make them hatch. They must be protected from light and from humidity; and, provided that the temperature is kept at between 46 to 59 degrees [of Fahrenheit's thermometer,] it is sufficient.* All these attentions do not require more than an hour and a half.

2. In order to be able to establish the temperature which suits best for hatching of the silk-worms, and in order to regulate it and keep it always equal, it is necessary for the conductor of the business to have at his disposition, and under his eyes, a well constructed and well graduated thermometer. For that purpose, those of mercury are best; but as these, if large, are very dear, M. Lagarde, optician at Paris, (Quai de Gèvres, No. 10,) makes them of spirit of wine, with which it is impossible to commit errors. He has constructed them upon the plan of a physician of Milan, and by instructions of M. Dandolo himself. For "the distance marked from the freezing to the boiling point upon ordinary thermometers is too small, the degrees are too near together, which sometimes causes mistakes to be made. To avoid this inconvenience, I have made, for the hatching-room, thermometers with long scales, the distance from the mark of one degree to another being equal to that of ten degrees of common thermometers. In this manner, I have been able to divide each degree into five fractions, which are easily distinguished, even at some distance. Thus, the least changes of the temperature of the apartment may be perceived. These thermometers have a sign which indicates the point at which the column of colored spirit of wine ought to stop." It will be most proper then, for the purpose of operating in a manner as certain as it is possible to do, to procure thermometers of this kind.†

3. The hot-house hatching room is made of a small apartment, 12 feet square, of which the walls [of brick] are quite dry, and in the midst of which, on one side, must be placed a furnace made of baked earth, or rather of very light bricks. The furnace, or stove, should be capable of being heated with but little fuel, and gradually, in order that it may prolong and preserve its heat as much as possible, or that it may be augmented or diminished, as required, without letting any smoke get into the room. Thermometers should be placed at proper distances, to mark and show that the heat is every where the same; for, if it is certain that all the eggs of caterpillars do not come to the hatching point until surrounded by an atmosphere hot enough to cause the germ of life to be developed, and as silk-worms in our climates cannot certainly obtain the degree of heat which they would meet with in those regions whence they were brought originally, it is then absolutely necessary to supply that temperature, in order to make them hatch together, and that they may be developed in the same manner. There should be arranged, in advance, trays of wicker-work, or hurdles, or moveable frames, or shelves of fir, fixed near the walls by means of cross-pieces, which are implanted in the walls in such manner as not to leave between each two but 22 inches of interval, to place upon them the necessary boxes, constructed of paste-board, or of very thin white wood. The boxes of paste-board should be 8 inches square, with sides half an inch high, for an ounce of eggs to each. When it is desired to place more eggs than this quantity, wooden boxes are provided, of greater or less length and breadth, and with edges more or less elevated, upon which their respective numbers are to be marked. They are placed near each other, leaving between each two an interval of two inches width; and placed always at a convenient height to be examined at the ease of the manager, and for him to be able to move the eggs, from time to time, with a wooden spatula, or shallow spoon, which serves well to stir the eggs, without risk of crushing them.

By means of very sensible thermometers, it will be very easily perceived which are the places in the hatching-room where the heat is lowest; and thus it will be known where to put the eggs of which it is desired to advance or retard the hatching, according as the season may have been favorable or unfavorable to the putting forth of the leaves. By also adding some light tables, upon which may be deposited the boxes in which the worms are hatched, they can easily be changed from place to place on the shelves, at will, and as required.

With one window of large glass, the room will be well enough lighted. The light can do no harm to worms of the first age; and if there is need to moderate the heat, there may be fitted in the sash a moveable pane of glass, which will be opened or closed according to the degree of heat desired to be maintained, or there may be constructed an opening in the door, or, better still, an air-hole or ventilator through the middle of the floor, to be opened or shut by means of a trap-door. When the hatching of the worms is finished, this hatching-room should be put to the common uses of a laboratory, or feeding-room; and in it may be placed worms to be fed and reared, unless subsequent hatchings are desired to be made.

4. To properly order the time of hatching the worms, there will be need to observe the progress of atmospheric temperature, compared to the putting forth of the leaves; and ten days before the worms are desired to be out of the egg, they should be put into the boxes. The time should be noted, and written down, when each parcel of eggs entered the hatching room, with the number of the box which contained each parcel. By giving spaces between the boxes, it will be impossible for one parcel to be mixed with another. The wicker hurdles, or other moveable frames, will be covered with paper in the hatching-room, which should be heated from the first moment to 64 degrees of heat, and so kept for two consecutive days. The third day, the heat must be raised to 66 degrees; the fourth, to 68; the fifth to 71; the sixth to 73; the seventh to 75; the eighth to 77; the ninth to 80; tenth, eleventh, and twelvth, to 82 degrees.

By the signs which we are going to indicate, it will be very easy to know the precise time when the hatching of the worms is to be expected. For

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pounds French, are seven pounds and twelve ounces American weight.—TRANSLATOR.

*In the original, the degrees of temperature are marked by Réaumur's scale, which are changed to their equivalents in Fahrenheit's throughout this translation.—TR.

†The degrees marked on Réaumur's thermometer, the kind referred to in the text, are each equal to 2¼ degrees of Fahrenheit's, which is used in England and the United States. Therefore, the objection made to the small divisions of the degree, does not so much apply here as in France.—TR.

the eggs, which were of an ash-colored gray, become more or less black; they then pass to violet, then to a yellowish gray, and finally to a dull white; although those eggs which may have been washed in very high-colored wine, will retain the reddish tint to the time when the worms come out.

Often, before placing the eggs in the heated room, to make them hatch, they are made to undergo what is called *maceration;* which is done by enclosing them in little bags, which are placed under cushions, between mattresses, or in woollen coverlets. From time to time they are moved, stirred, and this operation is used only to hasten the hatching of the worms. This method is so much the more uncertain, as it is as impossible to know exactly what degree of heat the eggs may have undergone in advance, as to guess what degree will be necessary to effect the hatching properly. It is not necessary thus to grope our way to an object, in the dark, when it is possible to arrive at it with confidence and certainty.*

In every egg exposed to a state of heat continued for some time, the embryo which it incloses acquires its degree of perfection, and the worm is finally hatched. Indeed, when the eggs have been preserved from one season to another in a mild temperature, there is no need of so great a heat in the hatching-room. They may even hatch spontaneously and unexpectedly, and before the vegetation of the mulberry has yet put forth, if kept in a temperature of 55 to 59 degrees. It is then important and essential to apply the strictest attention; for it is an absolute and totally unnecessary loss when the young worms perish because their food is not ready to be used. To have them to hatch a little too soon is a great injury; but a few days too late is not so. But when the hatching has once commenced, it would be hurtful to the worms to have it retarded, and their developement would greatly suffer.†

It is only at the moment when the egg acquires the dull white color, that the worm is entirely formed, and ready to hatch; it may then be easily distinguished through a magnifying glass. At that stage, there should be placed upon the eggs, covering pieces of white paper, pierced, before-hand, with numerous little holes, made by an awl or needle of suitable size. Or very open muslin may be used instead. To collect the young worms, there must be laid upon the papers some very small shoots of mulberry, with the young leaves at their extremities. These are to be supplied as needed; and on them the worms will collect, (and may be easily removed,) after they climb up through the holes in the paper. These branches also serve to prevent any of the worms from wandering out of their proper boxes.

The worms which climb upon the paper the first day, are often so few in number, that it will be cheaper to get rid of them immediately, and to take care only of the multitude that will come out in the two succeeding days. The first few, if preserved, as they would keep in advance of the great number, would trouble the order to be established for the developement and raising of the others.

For collecting the worms as they are hatched, the small branches of mulberry are to be preferred to single leaves; because the latter might, by their weight, keep down the little worms, and prevent their climbing above; and the greater part might perish from being unable to surmount this obstacle. All the worms which are made to hatch in the manner described above, by means of the stove, possess a force and vigor which is marked by their deep chestnut color. Healthy worms are never reddish, and still less black. When newly hatched, and seen as placed upon the sheet of perforated paper, they appear to form a downy bed, spread out over the whole, in which are distinguished an infinite number of animalcules, with heads raised, which are surmounted with black and shining muzzles. The whole extent of their bodies is then stuck full of very small hairs, with some of a little greater size. Their cuticle, already white, is developed according as they advance in age, and the hairiness disappears gradually. In looking at the worms through a magnifying glass, their white skin is perceived very distinctly at the insertion of the head. Their tails are also seen to be set with a great number of hairs, remarkable for their length.

When the worms are about coming out of the eggs (by aid of artificial heat,) in the hatching-room, there must be placed at suitable distances basins of water, to moisten the inclosed air. This is to prevent a too great degree of dryness injuring their developement. The hatching is also favored by moving the eggs, from time to time, with a wooden spatula; and this movement becomes so much the more useful, and even necessary, as the moment of hatching is approached.

Nothing is lost by these operations; and, by omitting them, the inconveniences caused by the failure, might greatly and injuriously influence the worms during the whole remainder of their short existence. It is even highly to be desired, in the departments of France, where the raising of silk-worms is a general object of industry, that the government, as a means of augmenting and aiding the business, should establish in ever y small dis-

* All these preparatory steps are unnecessary to the young beginner, who does not intend, or is not prepared, to pursue the strict rules of procedure afterwards, through the feeding time. For such persons, almost all the good eggs will hatch just as well, as they stick to the old papers where they were laid. But it should be observed, that all the preparations described above are not for the purpose of making good eggs hatch more surely, but for the purpose of removing the worthless eggs, and the gummy, and every other foreign matter, so as to be able to know exactly the quantity of eggs that will hatch. It is essential to the correctness of all the future operations, to know precisely the weight of eggs.—Tr.

† Dandolo says that the eggs which have been subjected to the process of maceration, or otherwise kept through winter in a mild temperature, will hatch earlier (sometimes 4 or 5 days earlier,) than the eggs kept in a much colder state, though both parcels are subjected to the same heat and treatment in the stove-room, during the hatching process. Hence the importance of previously, as well as during that process, keeping the eggs always at certain and known degrees of temperature. And as the extension of the time required for hatching, or otherwise the increased heat, is not so objectionable as any uncertainty in calculation, or difference in the times of the worms leaving the eggs, it would seem that it would be best to keep the eggs in the temperature of a deep dry cellar, or an ice-house. Then the time of hatching under a certain temperature, and other like circumstances, would be precisely and always the same, and would be well known in advance.—Tr.

trict, a public hot-house, for hatching in common the eggs belonging to all the neighboring culturists. There is no doubt, but that in thus charging with the business an intelligent man, well instructed in the art of hatching the eggs, it would contribute much to diminish the losses met with in every year's stock of eggs; which losses occur for want of care, or in consequence of the procedure under a blind routine of practice, established by custom, and adhered to through ignorance or prejudice.

CHAPTER II.

Of the small laboratory.

I. If the too great heat, accompanied by dryness of the air which surrounds them, is injurious to the worms, when about to hatch, it is not the less necessary to use the utmost care that they may not be exposed to the least cold, even though it should be for but forty-eight hours. The place in which they are to pass their lives will be proportioned in size to the number of worms which are to be collected there; and it should be calculated in advance what space they will require to occupy, in proportion as they grow larger, and also what space will be required, so as not too much to affect the purity of the air. It is known by experience, that the newly hatched worms of as many eggs as would have weighed an ounce, will occupy a space of 7 or 8 square feet to the time of the first moulting; that it must be extended to 15 or 16 feet to the second, and then to 35 feet to the third moulting. The number of shelves, or of frames or hurdles, should be in proportion to these measures, so that the worms may neither be troubled, nor heaped on each other. The shelves or hurdles should be 22 inches apart, in perpendicular distance, and furnished with paper with upright borders, to prevent the worms falling off. These sheets of paper, as well as of the boxes, should be numbered, in order that no error shall be committed by changing their places, and to be able to attend to the worms in the proper order of their age, until their complete developement.

In the first or small laboratory should be placed two thermometers. It is to be so arranged as to be suitably heated, either by a stove, or by two small chimneys at the corners. The windows and doors will be placed so as to give enough light, and permit sufficient ventilation. The temperature is to be kept constantly at 75 degrees, always from 5 to 7 less than in the hatching room; and progressively according as the worm advances in age and becomes strong. But when the season is cold, and the leaves backward, this heat is lowered to 71 degrees, and even to 68, which is the lowest admissible temperature.

The prudent culturist, says M. Dandolo, has done all that depends upon his care, when he has put the eggs into the stove-room at the time that he saw the sprouts of the mulberry trees well developed, and the weather fair and warm. If, afterwards, the weather suddenly changes to cold, as took place in 1814, it is a highly important power to be able, without danger, to retard the hatching of the worms, and to prolong for some days their two first ages. To obtain this great advantage, there is nothing else to do, if it is the first day that the worms are placed in the small laboratory, but to lower, after four or five hours, to 73 degrees the temperature which before stood at 75, and four or five hours after to 71, and the next day to 68, if that should be necessary. This cooling of the air diminishes the appetite of the worms, gradually and without danger; and by this means are hindered the modifications which, at the 75th degree, would have led sooner to the moulting. At 75 degrees, the first moulting (or casting off the first skin of the worms) would be accomplished in five days; but six or seven are necessary at the reduced temperature. The second moulting is completed in four days at 75 degrees; but requires more than six days, if the temperature is between 68 and 71. Thus it may be seen how the culturist, who is prudent and intelligent, by thus prolonging the two first ages, may gain seven to eight days of time to ward off the dangers of an inclement season. There may be also gained some days in the course of the other ages, as will be seen hereafter. This gain of time for the leaves to grow, as will be readily perceived, may be a very great advantage.

The tables annexed at the end of Dandolo's work show that in 1813 the worms had climbed (to begin to spin their cocoons,) in 31 days; and that 38 were necessary in 1814, to give the time required for the mulberry leaves to ripen. I do not include in these seven days of gain the three of retarding the hatching of the eggs, which might have been used, when delay is required still earlier.

Those persons who will not take this care, and who do not employ any of the means indicated by art to prevent the ill effects of inclement weather, would be obliged to throw away all the worms hatched too soon, or otherwise to strip the mulberry trees so completely, that they would offer leaves of bad quality for the adult age of the worms.

These considerations ought to cause to be generally felt the necessity for retarding, rather than hastening, the putting the eggs to hatch; especially as knowing that, with a good method of taking care of the worms, there is nothing to fear from some days of hot weather; which would have no other effect than to complete the last moultings some days sooner. It is besides certain, that the silk-worms which are retarded choose the leaves suitable to their age, and particularly the ripest leaves, when they are in their last age; the time decisive of the profits of the proprietor, as the worm then acquires all its value.

II. After being hatched, if it is intended to raise the silk-worms in the same place, the little branches of mulberry, scattered over the whole extent of the perforated papers, which cover the little boxes after being filled with worms, are placed in the boxes, upon the little table, (or board, suspended by a wire, or by strings,) which is to serve to transport them to the small laboratory. There, upon other and thicker sheets of paper, numbered and marked like the boxes, should be taken those boxes which bear the same numbers; and the table being placed upon the edges of the hurdles, it will be easy to lay hold of the perforated paper upon which the worms are, and, by means of the the branches which support them, to make them slide off, to the papers placed upon the hurdles. To effect this more safely than with the fingers, (which always endanger the worms,) a little hook, made of wire, may be advantageously used. Care

should be taken to place all the little branches at suitable distances, so that they, as well as the intervals between, can be covered equally with leaves; and that the worms may be distributed equally every where. The space which they ought then to occupy, is 20 inches square. The sheets of strong paper ought to be 23 inches long and 21 broad. Of these, the worms should not occupy but 10 inches square, in the middle; and the worms hatched from one ounce of eggs, will therefore require four of such paper sheets. That will suffice until the end of the first moulting; for their extent of surface being four-times that of the little box, there will be no need of moving the worms at all, during that time. The worms should then be fed with a few young and very tender leaves, cut up equally into small pieces, spread equally upon and between the branches, in order that the worms may cover them regularly. And if, by chance, the worms should gather together too thickly in some places, some whole leaves should be put on these places, and after enough of the worms have crept upon them, these leaves should be put in spots the least supplied before. These should be fed as the first; but nothing should be given to them before the sheets of paper are completely furnished, in order that they may all together receive their second meal.

As the whole number of worms designed to be raised together, will scarcely hatch in less time than 48 hours, all the earliest hatching will have gained some increase of size before the last appear, which difference of time is caused by the difference of heat in different parts of the room. But this difference of size will disappear soon, upon giving the most food to the latest hatched worms. They will soon be as large as the older ones.

After all that has been said, it may easily be imagined that there will often be more than three days required to hatch all the silk-worms desired to be obtained from a certain quantity of eggs. For, if the moths, according to the temperature in which they are kept, take from ten to fifteen days to appear, and come out of a certain quantity of cocoons, it is clear that their eggs will also be laid in the same space of between ten and fifteen days. But it would be difficult to explain why eggs which are all put to hatch the same day, exposed to the same degree of heat, do not permit their worms to come out at the same time. It can only be attributed to the peculiar constitution of each egg, and the care taken to confine them to the degree of temperature which suits them best.

It is not the less true that a culturist who has but one little box of eggs, and of which the worms are all to be hatched and reared in the same chamber, ought not to count upon raising the first, and still less the last hatching; not that they are not good, but to avoid the trouble caused by the difference of age. Those persons who hatch many silk worms, and trust their rearing to other persons, ought to keep together all of the same day's hatching, and never mix the first with the last. It is much better to lose the worms hatched the first day, and all the eggs not hatched on the third, than to be troubled with the care of them.

As to those which have to be carried to laboratories far from the hatching-room, it is necessary to place the whole ounce upon a single sheet of paper, in a single square of 18 inches, which is divided into four. By passing the hands beneath the litter to which the worms are attached, and making the fingers penetrate to the middle, the separation is made with facility, observing to divide them as equally as possible.

If these early attentions are neglected, a large proportion of the worms will be lost, even if they do not come [to the different changes of condition] very unequally, and do not contract particular diseases which will be described hereafter.

For the greater facility of transporting to a distance all the worms which have been hatched together by artificial heat, use may be made of a close box, or case, made in the form of a small book-case, with folding doors; but of which the shelves are only two inches apart. The shelves are moveable, and slide in parallel grooves. The case has two handles, or straps, on the posterior face, to enable it to be fixed to and carried on a man's back or shoulders. If such a box or case cannot be readily procured, a common scuttle, *(hotte)* or hamper, may be substituted, taking care that the worms are not exposed to cold. To secure this object, the case should be covered with paper well secured with paste. The shallow paste-board boxes, containing the young worms, will be placed on the shelves, which will leave a space of 1½ to 2 inches above the worms; which will afford room to sprinkle over them tender mulberry leaves, cut up into fine slips. If the journey is to be of much length, it should not be made but in the mildest part of the day, between 11 o'clock and 2 or 3 at latest. In the morning, and still more in the evening, the atmospheric variations would be injurious to the worms.

If the embryo worms experience any damage from the alternations of heat and cold, they will suffer much less when the temperature becomes four degrees colder, than when it becomes as much warmer. As to the light, its influence is of a kind so little marked, that it would be difficult to perceive its effect. If, in the morning, when the sun strikes directly on the windows, the worms are seen to appear in greater quantity, it is solely on account of the increase of heat. If all things were equal in the preliminary dispositions in relation to the brood, it is certain that they might almost all hatch at the same time. And when the worms are to be distributed among other persons, to be fed and reared, they should be given out upon sheets of paper which can contain an ounce, all hatched at the same moment. That will facilitate the proper division of the worms, as hatched on the first, second, and third days. In the stove department, no good eggs can pass the third day without hatching.

CHAPTER III.

The different ages of the silk-worm.

The most important part in the management of silk-worms is to know well, and to maintain steadily and without variation, the degrees of heat, and the temperature, which is most suitable and beneficial to them, during the term of their existence.

It cannot be said that the silk-worm is endangered by any degree of heat of the climate of France, however considerable it may be. Originally from Asia, it supports in its natal country a heat certainly more powerful than any which it can experience in Europe. But it is hurt by any

sudden transition from a feeble to a strong degree of heat. It may be said in general, that the too rapid changes from cold to heat, and from heat to cold, are very injurious to them. In their own country, they are not exposed to these vicissitudes; therefore they thrive there very well, and do not require the care which we are obliged to give them in our climates, where the temperature of the atmosphere is so inconstant, that without the help of art we would not be able to have it steady in the laboratories where the silk-worms are fed.

A long course of experience has proved that, in France, the 68th degree of heat [indicated by the thermometer of Fahrenheit,] is the most suitable to silkworms. There are some culturists who have pushed the heat to 73, and even to 77 degrees, and the worms have succeeded equally well. It must be kept in view that it is not the degree of heat, but the too sudden changes, from one to another, which injure silk-worms. If it happens that it is necessary to hasten the growth of the worms, on account of the advanced state of the leaves, (of which the progress could not be retarded,) it should be done by increasing the heat very gradually, so that the worms will scarcely perceive the changes. For they suffer, it may be said, as much by sudden variations of temperature, as they would by the difficulty of breathing, if plunged into nephritic air.

M. Boissier de Sauvages states that being pressed by the advanced growth of the leaves, which were well out in the first days of April, he gave to his silk-worms about 100 degrees of heat in the two first days after hatching, and about 95 during the remainder of the first, and through the second age. They took but nine days for both these ages, or from the hatching to the second moulting inclusively. All the persons who visited the laboratory supposed that the worms could not but suffer by so great a heat, which produced profuse perspiration in a few minutes after entering the apartment. The walls, and the edges of the hurdles were so hot that it could not be endured to keep the hand on them. They felt sure that all would perish. Nevertheless, all went on perfectly well, and, to the general astonishment, the crop of silk was abundant.

He afterwards allowed 93 to 95 degrees of heat for the first age, 89 or 91 for the second; and, what was singular, the duration of the first ages of this raising was nearly as short as the former, of which the worms had much more heat. The cause of this probably is, that there is a limit below which the life of the worms cannot be abridged, whatever degree of heat they may be made to bear. It is true that to these had been given, in this raising, and in the ordinary mode of treatment, a like number of repasts. But what is still more strange, is, that the worms thus hastened, took but five days for each moulting in the two first following ages, although they were then in a temperature of only 82 degrees; while worms which have not been, from the commencement, pushed forward in the same manner, require, at the same heat, seven to eight days for each of these same ages, that is to say, for the third and fourth. It seems as if it were sufficient to have put these little animals in the proper train, for them to obey the first impulse, or the first bend given to them. This early high degree of heat, as given in this case, which produces a rapid growth, gives the worms, at the same time, a vigor and activity which they carry into their following ages; and this is an advantage in the hastened rearing, (that is, pushed forward by heat,) and which, besides, prevents many maladies. This hastened management abridges the trouble and the labor, and releases the manager sooner from the inquietude and sense of insecurity which he will always feel until the cocoons are completed, and gathered.

To pursue this method of using high temperature, it is necessary to pay the utmost attention to the seasons' being more or less advanced, and to the state of growth of the leaves, and that there is no danger of that growth being afterwards checked by cold. On the other hand, if the putting forth of the leaves is backward, and it is followed by heat which lasts long, as may usually be expected, and yet if but little heat is kept up in the laboratory, the worms will advance slowly, and their growth will be prolonged. Still the leaves grow and become harder, and have too much consistence for the worms in their backward state. This then is a state of things in which the growth of the worms should be hastened by continued higher temperature, in order that their progress may be brought up to that of the growth of the leaves, which is an essential point.

If a culturist should determine early to pursue this method, he should set and hatch his eggs some days later than the others. For a still greater degree of prudence, he will wait eight days, and will calculate afterwards the duration of the ages; or rather, he will do better to so arrange his procedure as to have the latest feeding of the worms to correspond in time with the state of full growth of the leaves.*

It has been said above that the worms produced from an ounce of eggs, ought to occupy, in their first age, and to the first moulting, a space of 7 or 8 square feet; of 14 or 15 to the second moulting; of 30 to 35 until the third; and for the fourth and last, the space ought to be at least 83 or 84 square feet. It is also necessary, in fixing the proportion of the quantities of food, given to the worms, to the spaces allowed, not to forget, that until the first moulting the temperature must be constantly maintained at 75 degrees; in the second age it will descend to 73; in the third, the temperature should be from 73 to 71; and from 71 to 68 degrees in the fourth age. These degrees of heat being well established, there should be given to

* This new mode of rearing worms under an unusual and very high temperature, if sufficiently tested by experience, would be a far more valuable improvement in practice in Virginia, and the more southern states, than in France. For, one of the greatest dangers which threatens silk-worms here, is the circumstance of the heat of the weather occasionally rising so much higher than the proper temperature for the interior of the laboratory, that the latter could not be kept down by shading and ventilation. This evil would sometimes happen to the earliest broods; and would certainly attend second or third broods, reared in midsummer, if the usual degrees of temperature directed above, were attempted to be preserved, or if no artificial mode of heating were put in use. This new mode of using great heat would be an admirable and sufficient safeguard against this otherwise certain and great evil; as the heat used would rarely be exceeded by the natural heat of our hottest days.—TRANSLATOR.

the worms then, after their hatching, their arrangement, and their distribution upon the papers, 6 pounds of young mulberry leaves, clean, and chopped or sliced very small. In the second age, the quantity should be increased to 18 pounds, but cut up less finely; in the third, 60 pounds of leaves will be required, still less cut; and, lastly, in the fourth, the quantity of leaves must be increased to 180 pounds, the leaves only cut about to half the size.

However, there may arise some unforeseen circumstances, of which it would be difficult to calculate the effect in advance. But with care, and, above all, with foresight, we may be able to effect the hatching precisely when the trees offer tender leaves, and which will acquire more or less firmness in proportion to the advancement of growth of the worms. If the contrary case should occur, it would compel the loss of the stock of worms, (unless another brood could be procured,) whenever a bad season should greatly retard the shooting of the leaves. If after hatching the worms in good and apparently settled weather, it becomes inclement unexpectedly, it is easy to retard the rate of growth of the worms, at least during some time, and thus to suit their after progress to that of the before suspended growth of the leaves. In the case when the leaves shall not have the requisite qualities, they should further be diminished or increased for the repasts, according to circumstances. For, all the quantities which have been determined by approximation, although confirmed by reiterated experiments, depend almost entirely upon the degree of heat in which the worms are kept and fed. In fine, the economy or procedure prescribed in such cases, does not prevent them from devouring their food with great appetite, digesting it easily, and being preserved constantly in a state of vigor, and excellent condition.

To economize the food and to obtain a crop of cocoons as abundant as possible to have, such are the principal objects which every silk-culturist should have in view. It is known, by experience, that by over-loading the worms with food, there is not only lost the value of the food wasted, but also, by the accumulation of litter, the little vigor which the worms enjoy during some moments of their existence undergoes changes in the time of moulting, which make them pass from having good appetite, to astate of visible languor; and if care and attention are not redoubled, the worms become weak, languishing, sick, and do not wait long to perish. But if, to the contrary, nothing is neglected of the attentions which should be observed, and if the course advised for the best developement of the worms is followed exactly, there will be saved a quantity of cocoons proportioned to the quantity of eggs set, and of the mulberry leaves consumed. For M. Dandolo assures us, 1st. that when 110 or 120 pounds of cocoons are obtained from one ounce of eggs, there will have been consumed very nearly 1650 pounds of leaves; 2d. that when from an ounce of eggs, there is obtained but 55 or 60 pounds of cocoons, there will have been used about 1050 pounds of leaves; in which supposition, there would be required about 2100 pounds of leaves to obtain, from two ounces of eggs, the first named quantity of 110 or 120 pounds of cocoons; 3d. that the 110 or 120 pounds of cocoons obtained from a single ounce of eggs, are worth much more than the same products from two ounces of eggs.

If, as M. Dandolo affirms, from an ounce of eggs, hatched and well taken care of, we may obtain about 165 pounds of cocoons, any deduction from that amount must be considered as so much actual loss; even though the consumption of leaves may have been much more considerable. And if there is added to this loss the injurious influence, which the worms which die in the course of their developement, have upon the survivors, the amount will be greatly increasd. The dead bodies increase the indisposition and feebleness of the living; and the more the number is diminished, by want of care, the less silk of good quality will be furnished by the remaining worms, in proportion to the number. It is much to be desired, to remove all doubts on this subject, that there should be established a parallel between the quality and quantity of cocoons produced by a good manner of treating the worms, and the bad, which results almost always from the common routine of practice, and from prejudices, as much as from negligence. A series of tables, which even though but approximations to truth, in a succession of many years, with the meteorological indications of the atmosphere, during the season, would be the best means to employ for the purpose of knowing well the losses caused by the state of ignorance, out of which the managers of silk-worms are not willing to be drawn, whatever efforts may have been made for their instruction and benefit.

The first age.

The first day. Scarcely are the worms hatched and distributed on the squares of paper, as described above, when it is necessary to give them food four times, in quick succession. [3¾ pounds in the twenty-four hours.] For that purpose, the young leaves are cut into slender shreds, either with a sharp knife, or in a suitable cutting box, [constructed upon the principle of a straw-cutter,] and distributed with moderation for the first repast, to be augmented for the second, third and fourth, at the distance of six hours from each other. There is not necessary to the worm but an hour and a half, or two hours at most, for it to be filled and to fall then into a sort of torpid state, during which there is need to watch and keep the temperature constantly equal, and to avoid all changes of hot and cold. For five ounces of eggs, it is proper to place the sheets of worms upon a space of the shelves of 36 square feet, 8 inches; and to distribute over them very nearly 4 pounds of young leaves, tender and cut small; while for one ounce of hatched eggs, it will not be necessary to exceed a pound and a half. A space of twenty inches square suffices also to contain them, so that the leaves will be found eaten through. As the worms as yet reject no excrement, it would be useless to change their place. Then they are so frail and delicate that they should not be touched with the hands. If any of them get too much scattered, they should be carefully lifted with a slender twig, or a large needle, to be put back to their place. For gathering up the leaves scattered too far from the worms, a little broom will be found useful. At this stage of its life, the silk-worm will eat its own weight in leaves in twenty-four hours; therefore, all, for one repast, should not be distributed at once. On the contrary, some

should be reserved to give in the intervals, and principally on all the places where leaves appear to be deficient, because strewn there too thinly at first.

The second day, there should be used, in the twenty-four hours, from 6 to 7 pounds of fresh leaves, cut very small; taking care to give a smaller share of the day's allowance at the first time, and all that remains at the last. The squares are enlarged by degrees. Already the aspect of the worm is not the same as on the day before. Its head is larger, and whiter; the color of its body diminishes; its villosities are much less apparent.

On the third day, as the worms now eat very greedily, and as they occupy almost two-thirds of the sheets of paper, there should be given to them 3 pounds of cut leaves at each of their four repasts. In order to satisfy them the better, the first time there should be given but half of the allowance; and if it is eaten in an hour, the time for the second regular repast should be hastened, as well as to give the reserved help of the first repast, in the interval between the two. Without their being entirely covered over, their particular disposition and the quantity of leaves cut to distribute, might alone serve as guides in the matter. Their heads, towards the close of this day, are much whiter; they have taken much more developement; the villosities have almost disappeared; their skins have become reddish-brown; their bodies, and especially their heads, have become shining, with a semi-transparent appearance.

On the fourth day, as the appetite of the worms diminishes, so ought their food to be lessened. There should not then be used but 7 pounds of cut leaves. The first distribution will be of 2¼ pounds, and the others will be diminished in proportion to the quantity of leaves of the preceding repast which may remain untouched. The attendant will also take care of the sub-divisions of the intermediate distributions. The sheets of paper are now covered with worms completely. By enlarging the space covered with leaves, at each repast, they are prevented from being heaped upon each other, which might be injurious to them. As from the first part of this day the worms agitate their heads, it is a proof that their outer skin now troubles and overloads them. A great number of them eat but little, and their heads have grown much, and are more shining. By the evening, the worms are almost all still, or torpid, and eat almost nothing. Their bodies are almost transparent; they approach to moulting, and if observed near, and against the light, they appear of a dull white, livid, and yellowish.

On the fifth day, during the whole of it, 1½, or at most 2 pounds of fresh-cut leaves are sufficient. They should be scattered as equally as possible in the course of the day, and only in the places where worms are perceived in a condition to eat. The quantity of leaves indicated, should, of course, be increased or diminished, if, from any circumstances, the worms should need more, or less. There cannot be too much attention paid to the exactness of the distributions, and the economy of the leaves. Towards evening, the worms are almost all torpid or still; some of them are beginning to revive.

The first moulting, [or casting off the first or outer skin,] is now terminated. The worm takes an ash-color. Its vermicular, or crawling motion is very decided; all its rings go and come upon themselves in a manner much more easy and free. The leaves which are to sustain them ought to be gathered at least eight hours before being given to the worms. Leaves may be preserved even for a day or two, in a cool and dry place, sheltered from heat and light.

Thus the first age of the worms is usually complete on the fifth day, without counting in the two days occupied in their hatching, and in collecting and distributing them from the moment of leaving the eggs. To this time they have consumed a little more than thirty pounds of leaves. They have increased to fourteen times their first weight in the space of six days; and increased in length to four or five lines, since coming out of the egg, when they are scarcely one line in length.*

It is especially recommended, to renew, from time to time, the atmospheric air which serves for the worms to breathe in the small laboratory, either by opening the door, or the window, if the season is mild. In the contrary case, of cold weather, the worms are warmed by the furnace, or the fireplaces, if there are any, to maintain equal and constant the degree of heat which is necessary to keep them healthy, vigorous, and in good condition. It is even, in some manner, upon this first period of their existence, that depend all the other circumstances which are to bring on the successful termination in view.†

II. *Second Age.*

In arriving at the second age, the worms from five ounces of eggs should occupy a space of 73 square feet of the shelves, or thereabout, and the whole space should be covered with paper. The temperature in which they are kept ought to be from 73 to 75 degrees. To change the litter, it is proper that the greater number of the worms should have awakened; and when they come out of the leaves where they were placed, they ought to be changed immediately. When they are unequal in reviving, it is caused by their not having been distributed according to the rate of their developement; from the greater part having eaten continually, while some have remained under the litter, and all the others upon them, and prevented thereby from breathing freely, or were nearly suffocated under the leaves, where they become torpid, when they should have awakened. In short, the inequality of awakening is owing to the differences of vitality, or the decrease of it, into which the worms have been forced by the negligence of those who should have watched over them. The inequality of awakening, may also be attributed to the first hatched worms not having been put in the coolest places of the laboratory, or the latest hatched not being put in the warmest; or by not having increased the growth of the latter by supplementary distributions of

* A line is one-twelfth of an inch.—Tr.

† Throughout each of the ages, the like general increase, first, and then the decrease of appetite, occur, and the same general rules for distributing the food should be observed. That is, during the first part of the age, the meals of each day should successively be increased in quantity, as well as the successive days' allowances, until the maximum of appetite and of food is reached; and then a decrease of each day's several meals, in succession, until the worms again suspend their eating.—Tr.

leaves, to make them overtake the growth of the earliest ones. From the operation of these causes of inequality, some worms are in the torpid state, while some others are eating, after having awakened, and the slowest still eat because they have not arrived at the torpid state. Also, it is as common to see, upon the same sheet of paper, worms of four different sizes, as it is for the last-comers to perish. It is upon going out of the moulting, that they experience the greatest need of air, and of mild heat, equally distributed, to hasten the consistence and energy of their organs, and especially of their muzzles, which, now stripped of their first scaly covering, are again hardening by contact with the surrounding air.

In the *first day* of the second age, and the sixth from the birth of the worm, there should be provided nine or ten pounds of small twigs of mulberry, as tender as possible, and as many fresh leaves, cut small, after being cleaned and picked over.* Also, all the preparations should be made for changing or removing the worms, in order to clean the first sheets of paper upon which they were kept. When they are perceived to be generally awakened, that they agitate their heads, or hold them elevated, as if searching for something, and when some of them have wandered from the litter, the removal should be commenced with those which show most motion. For this purpose, the small mulberry branches, with their leaves, are laid over the papers of worms, with spaces, [one or two inches wide,] left between. Very soon these boughs are covered with worms; then, by means of small moveable boards, very smooth and even, the little branches of mulberry may be changed with the worms on them; and, instead of keeping them as before, in squares, there are placed bands, (or moveable dividing strips of wood,) across the shelf, and are disposed in such manner, that there is nothing to do but to enlarge the two sides of the compartment, [by moving outward the bands, or sliding strips,] whenever there is need of more room; for, at first, the worms ought not to occupy but the half of the space in each small compartment, which is intended for them afterwards.

By means of the little tables, or boards of transport, which are rested with the long side upon the hurdles or shelves, and inclining them, the little branches on them, with their burden of worms, are gently slided off upon the shelves, where they must be arranged in proper order by the hands. Whenever there are seen a few more revived worms, left still uponthe old litter, more of the little branches are put there, to gather up and to remove the worms, as the preceding, to the leaves disposed for them—which must be counted as one distribution; for, in a very short time, there will be nothing of them remaining. The contact of warm air is then sufficient to develope their jaws, enfeebled by the moulting; and far from being inclined to remain upon the litter, where they were, they are seen grouped upon the little branches which have served for their removal, and adhering so closely as to remain heaped together. For the purpose of changing the place of silk-worms, at all times, this is the best method to follow.

One or two hours after the worms have been removed and placed upon the shelves, there should be distributed to them three pounds of leaves, cut small, as before. In the cases where the worms, though crowded upon the stripped branches, may leave vacant intervals between them, there should be placed on these intervals other leaves, so as to make them extend themselves, and occupy the whole space designed for them, after this first repast. The two others, for this day, are to be given at intervals of six hours from one another.

The removal of the worms to the other shelves, being finished, the first sheets of paper which they occupied must be rolled up, to be carried out of the laboratory. For what remains on them is only excremental matter, and the cast skins, mingled with the remains of the leaves fed on since the birth of the worms. Out of thirty pounds of leaves given, it may be counted on that twenty-two and a half will have been completely digested.

In the *second day*, there should be given thirty pounds of cut leaves, to be divided into four portions, and given at intervals of six hours. The two last distributions should be rather larger than the first. The enclosing strips should be enlarged, and moved to the compartments this evening, so as to permit two-thirds of the whole space to be completely occupied. The worm is now of a clear white color; its head is a little larger. They are dispersed, as has been said, by taking them upon little branches, to bear them to the places where there are too few. It is very important that they should be equally spread over the surface.

In the *third day*, the two first meals should be more abundant. There should be used for this day thirty-three pounds of leaves, cut small, taking care to proportion them according to the wants of the worms. For, towards the end of this day, not only does their appetite lessen, but again they hold the head high, they cease to eat, and fall into a marked state of torpor. Their spaces are again enlarged, so that they now have four-fifths of the whole.

In the *fourth day*, there should be distributed to the worms only nine pounds of leaves, picked, cleaned and cut, observing always, to divide them equally and lightly. When once completely torpid, it is not until the next day, and after the termination of their second casting off their skins, that they will awaken. Then their second age will be entirely completed. In calculating their consumption of ninety pounds of cut leaves and little branches, with what remains of the litter, it is seen that it required twenty-one pounds to feed each ounce of worms, considered separately. During this second period, the worms are become of a clear gray color; the hairs are so shortened as to be seen with difficulty; the muzzle, which had been black, has whitened, and, immediately after the moulting, is soft, soon to retake its first form

* It is obviously an important saving of trouble to pick over the leaves carefully, before chopping them, and to remove all dead leaves, and other parts, or foreign matters, which are unfit for food. For even if none of these matters are otherwise hurtful to the worms, their presence will prevent the quantity of food given by weight being accurately estimated, and moreover will serve greatly to increase the mass of litter and filth, and will cause more labor to separate it from the worms, when removed at last, than would be required to avoid distributing them with the clean leaves at first.—Tr.

and first color. It hardens even according as it makes progress, and according to the need of having food a little more solid. Upon the back are seen two curved lines, opposite to each other. The worm has grown in length two lines, and already it has need of a much greater quantity of air to respire at its ease. Its respiration, greatly increased, exacts a more frequent renewal of the air, either by opening the windows when the outer air is mild, or by opening the door, or the smaller opening made in the door, and until the thermometer shall have sunk two degrees.

III. *Third age.*

For the *first day*, the preparation for feeding should consist of 15 pounds of clean-picked and fresh leaves, less cut than the preceding, to which should be added as much in weight of small branches. The worms of five ounces of eggs will now occupy 174 feet of the shelves, which should, as before, be covered with paper. They will be kept in a temperature ranging from 71 to 73 degrees. They must not be changed to new places until it is seen that they have almost all come out of their torpid state, (which usually takes place in 24, or 30 hours at most,) by a movement of turning which they make with the head. Agitating the air cannot hurt them, though, when breathed upon, they seem to experience a disagreeable sensation. To remove them, after this moulting, there should be used the same procedure and precaution as before. If the spaces which silk-worms should occupy, in their different ages, are correctly calculated, there will be nothing more easy than to lift them, to clean them, and to dispose them anew upon hurdles or frames, where they are left until they have completed their moulting, at a sufficient distance from each other. They eat now with the greatest facility. Their litter cannot injure them in any manner. Their first repast will consist of the 15 pounds of little branches with all the leaves growing on them, which, when eaten, will be replaced by 7 or 8 pounds of other leaves, equally distributed by means of the broom. The most essential point, then, for him who is charged with the care of silk-worms, is to distribute them equally upon the shelves, or the hurdles, as well as to watch over the just distribution of the leaves with which he feeds them; for to furnish too great a quantity would be an absolute loss, and the excess would serve but to augment the litter, which would lead to its certain fermentation, and might be the occasional cause of many diseases.

This day will be terminated by a distribution of 7 pounds of leaves. Or if they should not be wanting, they should be kept to add to the supply for the next day.

It may take an hour, or two at most, to change the worms which are to cover 174 feet of shelves or frames. Always as soon as possible after removing the worms, the litter should be rolled up with the paper, and carried out. Before getting rid of the litter, search should be made in it whether there may not remain there some torpid worms, which the contact of the open air will reanimate much sooner than that of the laboratory; and after having placed them upon some little branches, they should be brought back to the others. As to these last roused, they should be kept on separate shelves, in the warmest parts of the laboratory, and allowed plenty of room.

From this time the consumption of the worms is very great. To give them the leaves easily, there should be provided square baskets, shallow and wide, with handles, by which they can be suspended on hooks, any where, and may be emptied, using both the hands together, of the leaves which they contain, to be distributed at will, whether at the height of the individual, or upon the more elevated shelves, by aid of little stools, or very light ladders. When the worms shall have eaten three or four of these meals, it will be perceived that their size is sensibly increased, that their color is brighter, and at the same time that the muzzle is lengthened.

On the *second day*, there must be provided 90 pounds of picked and cut leaves, of which the two first meals will be smaller than the two last, because that by the evening the appetite of the worms is increased. The space occupied by them also should still be enlarged gradually.

On the *third day*, there must be distributed to the worms seven pounds of cut leaves more than the quantity of the previous day; observing to give the greatest shares at the two first meals. The distribution of food for the evening ought to be less, because the worms are then losing their appetite. They have now grown much in size, are becoming white and transparent, their heads are lengthened, and the circumvolutions which they make with it, precede the moment when they are going to become torpid again.

On the *fourth day*, the food will be only 52 pounds of leaves, because the appetite of the worms is much less. The greater number are already torpid. The share for the first meal should be the largest, and for the last, much less. The leaves should not be spread but in the places where they are needed, and the want of them is perceived. In case there are found on the same shelf some which still require food, there need be no fear to give it to them, that they may more quickly reach the state of the others. Excellent effects are obtained from these intermediate meals.

For the *fifth day*, the distribution of cut leaves should be only 27 pounds in all, and shared only to the places where it is seen that food is wanted. Since the day before, there may be seen throughout some of the foam or slaver of silk, which the worms have rejected. They are seen now to seek to go to their sleep, in free air, in the dry places, and holding the head continually raised; and those which are compelled to remain on the litter, elevate their heads above it, maintaining the same position. At the instant when they are passing into their state of momentary torpor, they evacuate all that they have within their bodies; the intestinal canal is then distended by a lymphatic fluid, yellowish and transparent; the outer skin becomes wrinkled and dry before being cast off. During all the time of the moulting it is necessary to agitate and renew the air of the laboratory, taking care to keep the temperature at the previous degree of elevation.

On the *sixth day*, the greater number of worms are disposed to revive from their torpor. Their third age is now completed. They have passed through it in the space of six days, consuming 300 pounds of leaves and small branches; which is nearly 69 pounds to the ounce of eggs. Their muzzle is lengthened, and jutting out; from black, which it was before, it has become of a reddish-gray; the head, the body, have sensibly increased in size; the body is covered with wrin-

kles, as well as the head, and the skin no longer appears hairy. The general color borders upon yellow orange. All their feet towards the posterior end being developed, permits the worms to cling strongly to whatever they touch and eat. There is even heard a slight sound, which they make in moving from one place to another, which ceases when they fix themselves, and which becomes more strong as they grow older. Since the second moulting the worms have gained six lines in length, and have increased their weight fourfold.

IV. *Fourth age.*

The space which the worms should now occupy is of 412 square feet, and the temperature required for them is from 68 to 71 degrees; and even should it rise to 73 degrees, or higher, there will be no danger, provided the air be renewed from time to time, by opening the doors and windows, [keeping closed the venetian blinds.] By this means, the litter, is almost always moist, is hindered from entering into fermentation, and disengaging exhalations which would be extremely injurious to the worms. Many times entire broods have perished for want of such precautions being taken.

The hurdles should not be changed until almost all the worms have got over their torpor. Those first revived should be put in the places the least hot, and the last where the temperature is highest. The thermometer will easily direct to the proper places for both. These attentions are even indispensable, when it is required to make the worms climb (to begin their cocoons,) all at one time.

The third moulting being thus ended, the worms should be removed, that they may no more be disturbed, to the great laboratory; where they should have, that they may be at ease, 920 square feet of surface on the shelves, whether in one large apartment, or in several smaller, but contiguous, for the greater quickness and ease of the services to be performed. However, as at coming out of the third age, they did not occupy but 459 square feet, it is necessary to mark off the spaces in advance, and fix them by proper bands, or strips, which may be moved to enlarge the spaces gradually, and at will. There result from this arrangement, essential in every rearing of silk-worms, 1st, that the litter, (which it is not necessary should be taken away in the fourth age,) increases insensibly, and as it has very little thickness, there is disengaged from it no marked or hurtful odor; 2d, by such thin scattering of the leaves, it results that they are more equally eaten; they have no time to fade, and still less to be spoiled; 3d, that the worms, being suitably dispersed, eat much better, and at their ease; it is much easier for them to move themselves; and their perspiration, as well as their breathing, is performed in a manner which is extremely beneficial.

For the *first day*, which is the sixteenth of their existence, there should be provided for the worms thirty-eight pounds of small branches, and sixty pounds of leaves cut only to about half sizes, by the cutting-machine. When it is necessary to remove the worms, there should be spread some of the little branches of mulberry over two hurdles only at a time; and when these are filled and covered with worms, they are transported on the boards as before. The little branches may be substituted by numbers of the whole leaves tied together by their foot-stalks, to be spread out to receive the worms, and to be lifted and moved when filled with them. Two persons being charged with this part of the operation, and two others conveying the boards with the loaded boughs, or bunches of leaves, as quickly as possible to the places destined for the worms, will soon effect the removal. If there remain some which are still torpid, they must be collected and put in a separate place.

There are then distributed to the whole number thirty pounds of leaves, all along the bands, in strips, which are kept still at some width. The scattered leaves are gathered to the places where they are wanted, by the little broom. Soon all the silk-worms are disposed equally over the frames; and if the leaves are still cut for them for three or four more days, it is to induce them to eat quicker, by the leaves exhaling a stronger smell, and presenting many more surfaces to the mouths of the worms. The second meal being ended towards evening, when it is entirely consumed, the worms become whiter, have much more strength and vigor, and their movements are more marked.

For the *second day*, there will be used 165 pounds of leaves, still cut, though but slightly. Of this, the three first meals will be moderate, and the last ample. The space which the worms occupy is gradually enlarged, as they now increase in size rapidly. At the same time they take a much whiter color.

For the *third day*, there should be given in the four meals 225 pounds of leaves, cleaned and cut into large pieces. The quantities for the two last meals should be much greater than the two first.

On the *fourth day*, there should be fed 255 pounds of leaves. The three first shares should be about seventy pounds each, and the last, forty-five. Towards the close of the day, the silk-worms are about 18 lines in length; and they are still whiter than on the preceding day.

On the *fifth day*, as the hunger of the worms will have sensibly lessened, 120 pounds of leaves slightly cut, will be enough. The first distribution will be the most considerable. The worms almost all become still or torpid. The other distributions of leaves should be made only on the places where worms, not yet torpid, are seen. Generally they have increased in length two lines more.

For the *sixth day*, no more will be required for feeding than thirty-five pounds of leaves divided and given according as the want of them is perceived. By the evening, the worms will have evacuated; they are become much smaller; the green color has disappeared; they are covered with wrinkles which are scarcely visible.

In the *seventh day*, the silk-worms accomplish their fourth moulting, and come out of the torpid state. During the last 7 days they have increased in length six lines. They are now of a grayish and reddish color, deeply tinged, and their augmented weight is quite visible. During all the time of this age, it is absolutely necessary that the air of the laboratory should be kept in a state of continual purity. Thus it must be renewed as often as is found necessary, either by opening the doors, the windows, the air-holes, or the ventilators, whenever the outer temperature is nearly the same with that of the laboratory; and, in the contrary case, by making fires in the chimneys with very dry combustible matters. The purity of the air, in which the worms are continually kept, is of the

first necessity, to maintain their existence in a state of sustained vigor, and to prevent the contracting of diseases. The persons occupied in attending to the worms, ought also not to suffer any disagreeable sensations in breathing the air of the laboratory; and if they experience any such sensation, or affection troublesome to the organs of the chest, however little it may be, they should immediately use all the means at their disposal to renew the air which surrounds them.

V. *Fifth age.*

In the *first day* of the fifth age, which is the twenty-third of the life of the silk-worms, their fourth moulting is finished, and almost all are again aroused from their torpor. They ought now to be kept at a temperature of 68 to 71 degrees. Spread out upon 918 square feet of the shelves by a sufficient number of persons, this operation ought to be completed in eight hours at most. The first distribution which is necessary to them, amounts to ninety pounds of small branches, or whole leaves, and as much of others, but after having been cleaned. The branches must be spread out upon four or five hurdles. As soon as covered with the worms, the branches are carried to other frames, in the middle of each of which there is left a vacant interval of more than half the size of the frame. The frames from which the worms are thus removed, are then cleaned; and all the worms which may be still torpid, and left on them, are to be collected together, as directed formerly, upon separate shelves, in the warmest part of the laboratory, and taken such special care of, that they may arrive at the latter conditions in the same time with the others.

If attention has been paid in first placing the worms on half of the shelves—if the interval in the middle of the hurdles has been well preserved—in two changes, all the worms will be found equally distributed through all the interior of the laboratory, and in a suitable manner. The leaves of the branches used will have served for one of the meals; what remains of the leaves and other branches will be given after an interval of six hours; taking care to bring together with the little broom all the leaves too much scattered, and to disperse the worms which may be too much clustered together, into places where there is space to spare. At the last meal, which will be but of forty-five pounds of leaves, the boards should be again moved, to allow more space to the worms. All will then appear to enjoy a degree of vigor sufficiently well marked. Fresh air should be given by the windows, if the outer temperature should be nearly equal to that of the laboratory, and especially while the cleaning is done. Slight attention to the thermometer and hygrometer will serve to show what changes may be made in the air. *

In the *second day*, the spaces should be again enlarged, and there should be given to the worms, 270 pounds of clean leaves, divided in the following manner: fifty-two pounds for the first meal, and ninety-seven for the last; [the balance of 121 pounds, for the two middle repasts.] It is plainly seen, towards the end of the day, that the worms are much whiter than the day before, and that they are rapidly tending to their further developement.

On the *third day*, there should be spread over the worms, which are now very voracious, 420 pounds of clean leaves. The first meal will be of 77 pounds; the second and third, of more than 100 pounds each; and the fourth will take 120 pounds. It is very certain that they can eat much more; but the quantity indicated here has always appeared sufficient to keep them vigorous, when care is taken to continue to manage the bands, and enlarge the spaces in proportion to the increase of food. The worms are now 26 and 28 lines in length, and their whiteness is also much increased.

On the *fourth day*, the quantity of leaves to be given should still be increased. The first meal will be of 120 pounds, the two following of 135 each, and the last of 150. The appetite of the worms is still greater, and they have, in very little time, reached a length of about 3 inches. They consequently require much food, and there is nothing to be feared in giving to them the 540 pounds of leaves.

On the *fifth day*, the provision of leaves ought to be augmented to 810 pounds; of which the first distribution will be 150 pounds, the last 210, and the two intermediate meals, 220 and 230 pounds of leaves. It is also often of necessity to make some partial distribution of leaves, in the intervals of time between the greater, especially in places where it is perceived that otherwise the worms would be too long without food. If the frames need clearing, it should be done at the close of this day, or early in the next, in not distributing the leaves but upon four frames at once. But as the worms are no more to be changed, or moved away from the frames they occupy, the following method for clearing will be followed. In a little time after the leaves are spread, and as soon as they are covered with the worms, they are taken and placed as quickly as possible upon the little tables, or moveable boards, used for transporting, which are leaned for that purpose on the edges of the frames. The litter is then immediately taken up from the frames, and thrown into the baskets. This done, the worms are replaced as before on the frames; and so on, successively, with all the frames to the end.

With whatever quickness the litter may be changed, the operation is always too long; and, therefore, it is necessary to feed the worms first cleaned, so as to leave no interval, and that the meals may be shared equally between the last and the others. The manager must look well to the state of the interior of the laboratory, in respect to

* A hygrometer is any instrument for measuring or comparing the different degrees of moisture in the atmosphere. If no better can be conveniently provided, a very simple but sufficient one may be made with a long twine suspended from one fixed end in the laboratory, and having a weight at the other end, to keep it well stretched. The length of the string will contract in proportion to the degree of moisture in the surrounding air, and extend in proportion to the dryness; and the changes will be readily shown in a graduated scale, along-side or over which the weight will rise or sink, as the string contracts or expands in length. As the amount of variation will be in proportion to the length of the string, and, of course, the size of the degrees, marked on the scale, and the accuracy of the scale, the length may be made as great as desired, and yet the whole kept within convenient limits, by passing the string backwards and forwards, and horizontally, over the rollers of sundry small pully-wheels, which will yield freely to the slightest impulse of the string.—Tr.

humidity, to the atmospheric heat, and to the state of the air which is contained, in order that the worms may be preserved in their condition of vigor acquired by the progress of age. It is scarcely necessary to say that the litter heaped in the baskets should be carried out of the house immediately; and that in the handlings required for changing the leaves covered with the worms, great care should be taken not to wound or hurt the worms with the fingers.

On the *sixth day*, without being an eye-witness to the circumstances, it is scarcely possible to have a correct conception of the voracity with which the worm seizes on every thing presented to it. It even attaches itself to the fruit of the mulberry tree, which by chance are left among the leaves. This day, there will be distributed in four times, 975 pounds of leaves. The last meal should be much the largest share of the four. It must not be forgotten to add more leaves in all the places where the worms appear to need them, between the times of the regular meals, in the prolonging of which the worms now gnaw and tear all that is given to them. They are now 3 inches long; and if they are very white, soft to the touch, and of a velvet smoothness, they may be considered in the most perfect health.

The *seventh day* is that in which the worms complete the greatest length which they can acquire, and arrive at their full weight. If no more than six worms are required generally to weigh an ounce, they are then in their highest state of vigor. There will be distributed to them, in meals decreasing in quantity from the first to the last, nearly 900 pounds of leaves; and giving intermediate supplies, if required by circumstances. Towards the evening, their extremity, which had been white, assumes a yellowish color; it is said then that the worms are "*ripening*." Their mastication perceptibly lessens; it is the same of their weight, and of their length; they discharge a considerable quantity of excrement; there is a continual exhalation and evaporation rising from their bodies; and if they have, in about seven days, doubled their length, they are now going to decrease as fast.

On the *eighth day*, as the appetite of worms is much lessened, there will be need of no more provision than 660 pounds of leaves, which should be chosen as good as possible, and from the oldest trees. The first share should be the largest, say 200 pounds, and the following meals be lessened successively. And that the worms may ripen together, still, as before, some intermediate distributions should be made, wherever they are seen to be needed. The yellow color of the worm now extends from one ring to another; they become shining; are no more greenish; they diminish perceptibly in bulk; they seek the edges of the hurdles to evacuate all that ought to be discharged from their bowels. In proportion as it is perceived that they approach maturity, and, especially, if there is too much moisture, the litter should be removed, as quickly as possible. Strict attention must be paid to the state of the atmosphere in the laboratory, and to the removal or correction of every thing that can be injurious in any manner to the worms.

On the *ninth day*, the thirty-first since the birth of the worms, the provision of leaves will be only 435 pounds, to be distributed throughout, and wherever there is more special want. The worms are becoming more yellow, the surface on the back is more shining, the rings are orange, the muzzle is more clear. Currents of air, and exposure to sudden changes of temperature must be guarded against; though it may seem that the healthy and vigorous worms may suffer no remarkable inconvenience, even if exposed to considerable inclemency of the weather.

The worms, from their hatching to this time, have grown to forty times their first length, and, in a month, have increased to nine thousand times more weight than they were when just come forth from the egg. The most active period of their short life is the space of nine days comprised within the fifth age. There is yet, however, need for great watchfulness over the worms, that they may arrive safely at perfect maturity, which will not be until they throw off the skin that now covers them and change to the *chrysalis* form, losing, at the same time, half the bulk and weight of their bodies. The transverse bands reappear upon their backs, and the scaly prolongation of the muzzle becomes blackish, brilliant, and very strong. Their whiteness is much more decided that it has been before; and to the touch, they have the firmness of flesh, as well as velvet softness, especially when healthy and vigorous. At this time the worms should be kept not only in a warm enough temperature, but in air continually renewed, if for no other purpose than to favor the evaporation and aid the removal of the perspiratory fluids, which are transuding from the worms continually, during the last part of their existence in this form.

In the last period of the fifth age, for the formation and perfect completion of the cocoons by the uninterrupted spinning of the silk, until the moment when the worm becomes a chrysalis, it is necessary that the silk-worm should have its body composed of but two substances, the one the silk material, and the other purely of animal matter; and that the intestinal canal should be evacuated of all the excremental matter which it contained. It is therefore necessary to keep the worms in the most perfect state of cleanliness, and also to continue to give them leaves at the same time, not only to finish this day, but still to wait some twenty-four hours more for their maturity to be fully completed; which will be known by the following signs:

On the *tenth day*, the thirty-second from their hatching, when fresh leaves are given to the worms, if they climb upon them and do not eat—if they keep the neck stretched and the head raised, as if searching for something—if they are transparent, and of a fine yellow color—when they raise themselves upon the hurdles where they were supported, crawling slowly, and when they reach the edges, endeavor to go farther—when their rings disappear, and their greenish hue is entirely changed to orange-yellow, the neck becomes wrinkled, and all the body becomes soft—finally, if in placing one of the worms in the hollow of the hand, and looking at it facing the light, it is perceived that the light shows through it—then immediately every thing should be disposed to favor the immediate climbing of the worm, for the purpose of their beginning to spin their cocoons, lest any fruitless efforts in searching for places to spin, may exhaust some of their silk.

For the Farmers' Register.

TREATISE ON THE CULTURE OF SILK.

BY GIDEON B. SMITH.

No 2.

The laboratory, fixtures, silk-worms, &c.

The laboratory, or building in which silk-worms are to be raised, must be of a size proportioned to the number of worms intended to be kept. As to its form and structure, no precise rules can be given, nor, indeed, are any such necessary. Probably no two persons in Europe have laboratories precisely alike; and this fact goes to prove that no particular construction is necessary. All that is required, is, that the room should be of sufficient size to accommodate the number of worms intended to be kept; that it should be provided with fireplaces or stoves, for raising the temperature when necessary, and drying the air, and with ventilators in the ceiling, and windows on all sides, for the purpose of ventilation and light. I would, however, recommend wooden, instead of brick or stone buildings, as they are more easily managed as to temperature, than the latter; and, in damp weather, do not condense and collect water from the atmosphere so much. In a large room, three or four small stoves at the extreme ends and sides are very useful in severe cold times, and also in very damp weather. Ventilators may be very usefully made at each side of the room (if the house be a frame,) by leaving a space one or two feet deep, and the whole length of the room, and reaching to the floor, occupied by long shutters, hung by hinges on the upper sides. In ordinary warm, dry weather, these shutters may be raised, more or less, as desired, and thus the room kept well supplied with fresh air. During cold or damp weather, the shutters will, of course, be kept closed. A large room ought to have several vents for the escape of foul air, in the ceiling. These may be nothing more than ordinary trap-doors, two feet wide and three feet long, with shutters to close them at pleasure. When these are opened, and the ventilators at the sides also open, a free current of air will be kept up through the hurdles, and thus the laboratory will be kept free from impure air. They will be found particularly useful after a time of rainy or damp weather, during which it has been necessary to keep the room shut up. I have found *fire* particularly useful in these damp times, (though the temperature was sufficiently high of itself,) in purifying the atmosphere in the room. I generally make a brisk blaze with light-wood or shavings in the fireplaces or stoves. It has an admirable effect, not only in expelling foul air, but in enlivening the worms—probably by drying the damp air. I have found much more use for fire, during such times, than I ever have on account of cold weather. Indeed, we seldom have weather cold enough to do harm at the season of feeding silk-worms; though we do sometimes, however, it is of short duration. Permit me to make one remark here, on the effect of temperature on silk-worms. I would not be understood as saying or believing, that the temperature could be neither too high nor too low for a profitable result; but I do say, that silk-worms are not affected more than other insects, by its variations. Indeed, I am pretty well convinced, that ordinary variations of temperature are as beneficial to the constitutions of silk-worms, as they are known to be to other animals. *Extremes* only do harm. Do we not find that a continued sameness of temperature, especially if warm, is debilitating to our own systems, and to those of all other animals? Look at the people of the tropics. The temperature there is seldom higher than with us in summer, but it is more equable—always nearly the same. I need not allude to the effect of it on the constitutions of the people: their imbecile, languid, lazy, spiritless characters, are proverbial. As we go north, where the variations of temperature are the greatest, we find the constitutions of men and animals the most robust. Indeed, variations of temperature, and the agitation of the atmosphere in the form of heavy winds, appear to be beneficently provided by the Creator, for the well-being of all his creatures. Why, then, are silk-worms supposed to be exceptions to this rule? I cannot believe that they are; and my experience supports me in the belief of their being, like all other animals, only injured by extremes.

A pretty good calculation may be made as to the size of the room required, from the fact, that a room eighty feet long and forty wide will accommodate one million of worms. Instead of one room of that size, four of forty by twenty, I think, would be preferable, as being more conveniently managed, and being better adapted to a proper *division* of the worms, which may then be separated, each day's hatching being placed in a distinct room. The temperature of the rooms can also be more easily regulated, though possibly at something greater expense of fuel.

In large establishments, a hatching-room will be useful. This need not be large—say twelve by fifteen feet. It should be made close, with a couple of windows, capable of being perfectly closed by shutters at pleasure. A good stove should be provided, capable of raising the temperature to summer-heat, when required. This room may be conveniently used, also, for killing the chrysalis in the cocoons, as will be hereafter shown.

Another room will be necessary for the accommodation of leaves, a good supply of which for a day or two a-head, should always be provided, that no lack of a supply may occur during rainy weather. A loft over the laboratory, or a room in the basement, may be very conveniently used for the purpose. In a basement, leaves will keep fresh for three days, but they should not be left in compact masses, as they are apt to *heat*, from spontaneous fermentation. It is proper that they should be occasionally stirred and shaken about, to prevent such an event.

The fixtures of the laboratory, are convenient hurdles or shelves, for the accommodation of the worms while feeding, and spinning their cocoons. The best form and construction, are those first adopted by me, and which I believe are now in general use. They are two and a half to three feet wide, and four to five feet long. The size may, of course, be varied at pleasure, without detriment or inconvenience. The size mentioned will accommodate about 500 worms, when ready to spin cocoons. They are made like the outside frame of a window-sash, with a floor of netting.

The netting is now woven in the north for the purpose, and only requires to be tacked to the frame, well stretched. Formerly it was necessary to make the netting ourselves, which was done by perforating the sides and ends of the frame with a broad awl five-eighths of an inch apart, and inserting good skein twine first, length-wise, until it was filled, then crosswise, weaving it by passing it over and under the other twine alternately, and drawing it quite tight. The twine will be about five-eighths of an inch apart each way. It is of some importance, that the twine should be *tanned*, by immersion in a tanner's vat, for a few hours, dried, and then thoroughly washed, to remove any remains of the tan that may be on it. This ought also to be done with the prepared netting, if that be obtained. The utility of the tanning is obvious: it prevents rotting, to which the twine is liable, from the dampness of the filth. The netting should also be put on the frames in dry weather, because the twine is then at its greatest expansion; and if put on in that state, is not so liable to stretch and *lag*, when loaded with worms and food. Another frame of the same size, is to be covered with *paper* or muslin, to be placed immediately under the net frames, in the *stands*. These latter are used for the purpose of catching the ordure and filth that falls through the netting of the hurdles. They may be placed two or three inches below the hurdles.

The STANDS, for the support of the hurdles, are simply upright posts, made of three or four inch joist, firmly fixed to the floor below, and to the ceiling above, two feet apart one way, and just far enough the other to permit the free passage of the hurdles sideways between them. Pieces of wood are to be nailed to each two posts to support the hurdles, at about twelve inches apart. I had mine only nine inches apart; but I think they are better at twelve inches. Another piece is to be put upon the posts two or three inches below the others, to support the paper shelves. On this plan, it will be perceived, that the hurdles have the appearance of a set of shelves. The whole room is to be thus occupied with the hurdles, leaving alleys between each range for the free passage of the attendants.

The fixtures in the hatching-room, are simply one or more ordinary tables, sufficient to accommodate the eggs to be hatched, a thermometer, and a good stove.

HATCHING.—About the first of May, the eggs, which have, of course, been kept in the cellar since the time they were laid last season, are to be put in the hatching-room; the papers on which they are, are to to be spread out on the tables. If the temperature be not as high as 70°, it must be raised to that point before the eggs are taken to the room; if it be higher, *naturally*, it is of no consequence. Every day the temperature should be increased one or two degrees until the eggs are hatched; unless, as just observed, the temperature be above 70° naturally, in which case all that will be necessary is to prevent a depression at night, and changes of the weather. It will not be necessary, at any time, to raise the heat higher than 80°. Generally, in about five days the worms will begin to hatch. The first day, but few will come out, and these need not be regarded; but on the second day, considerable numbers will hatch, and they should be taken and placed on the hurdles, and the hurdles containing each day's hatching should be marked with the date of the hatching. Where there are four laboratories, as recommended in a previous page, each day's hatchings should be conveyed to separate rooms. On the third, fourth and fifth days of the hatching, the same routine must be observed. On the latter day, all the eggs will be found to have hatched, except a few scattering ones, which, like those of the first day, need not be regarded, as they will be too few in number to be worth any trouble; and if mixed with the others, will only cause confusion by their irregularity in moulting, &c.

For removing the young worms from the hatching-tables to the hurdles, I have found the best method to be, to lay whole mulberry leaves on the table, covering the eggs and worms completely. The young worms will soon collect upon the leaves, when they are readily conveyed to a small portable hurdle, by taking hold of the stem of the leaf, borne to the laboratory and laid upon the hurdles. Many thousands may be accommodated on each hurdle for the first week; and as the worms grow, and become crowded, they must be distributed to other hurdles. All these minute affairs will suggest themselves to the intelligent operator, as they become necessary. The morning is the time for removing them, as they generally hatch from day-light to 7 or 8 o'clock.

As soon as the young worms are placed upon the hurdles, a supply of food must be given them. The leaves may be torn into small pieces, and scattered over the surface of the hurdle, covering the young worms with them. They will speedily commence eating. The leaves on which they were borne from the hatching-room will, however, be sufficient for several hours. The worms are now to be regularly fed three times a day, with fresh leaves, torn into small pieces, the size of a dollar, or thereabouts, for the first week; after which, they are as well laid on whole. Care should be observed, not to lay on more leaves than will be consumed, as considerable waste would thus occur; and, also, not to allow the worms to remain one moment without food; it were far better economy, indeed, to waste leaves by giving too much, than to stint the worms, at any stage of their existence. For the first two weeks, no other care is necessary than attention to their being properly fed three times a day, as above remarked; keeping the room at a moderate temperature, by artificial heat, when cold, and by ventilation, when hot and sultry. The French divide the time of the worms' existence into periods, which are distinguished by their moulting, or shedding their skin. These periods are called ages, and very particular directions are given for observance at each of these periods or ages. I, however, have never found any particular necessity for much variation in treatment. Cleanliness, moderate temperature, and a full supply of food, at all times, are all I ever found either necessary or useful at any time. The periods of moulting are generally about the seventh, thirteenth, nineteenth and twenty-fourth days from the hatching; but these periods are materially influenced by the care and attention bestowed, and the state of the weather. Some worms will be ready to spin on the 25th day, while others will delay their spinning even to 40 and 50 days, according as they are

well or illy attended to. And here let me advise the young beginner, that *care is money;* for there is no kind of human employment in which care is so well rewarded, as in the management of silk-worms. The worms that by want of attention are made to spin out their time of feeding to 40 or 50 days, will have consumed double as much food as those that begin to spin their cocoons on the 25th to the 28th day; will have occupied double the time of the attendants; and, after all, will not produce much, if any, over half as much silk, and that of an inferior quality, as they would have done, if well attended to, and thus made to spin at the proper time. This fact, which I have abundantly proved in my own practice, should never be lost sight of.

The French also direct certain quantities of leaves to be given each day, during each age of the worms. This I never found of any service whatever. Worms will eat double as much one day as they will another, owing, probably, to the dampness or dryness of the air, or to various other causes; but whatever the causes be, the *ten* or *twenty pounds* of leaves directed to be given them, may be entirely too much or far two scanty an allowance. My plan is to keep fresh food on the hurdles at all times, and this I believe to be the only economical rule. I have often weighed the leaves according to Count Dandolo's scale, but never found the quantities he recommends to agree with the demands of the worms—they sometimes requiring more, and sometimes less. I imagine, that the idea of weighing the leaves for each day's consumption, in France, originated in the fact, that the leaves are grown by one person and the worms raised by another in that country; the person who raises the worms purchases the leaves by weight, and this making it necessary that the consumer should form some estimate of the probable quantity he would want each day. It could not have originated in practice; for, as before remarked, the consumption of leaves is not regular at any particular time.

The French also direct the leaves to be cut fine, and have knives for the purpose. The Chinese also do the same. For several seasons, I followed these directions, and cut the leaves with a sharp knife, but was ultimately led to doubt the utility of it, and to abandon it. On close observation, I found that the worms did not like the cut edges of the pieces of leaves, and have often seen them turn from them in apparent disgust. I at first supposed my knife was not sharp enough, and that hence the edges of the leaves were somewhat bruised in cutting; but it was the same with the sharpest knife I could use. Besides this, I found that the worms would get upon and press down the finely cut leaves, and thus cause considerable waste; and, further, that the leaves thus cut, would wither and become useless much sooner than whole leaves. On trying even the youngest worms with whole leaves, I found they would eat them just as easily as when they were cut. Even the old full grown leaves were as readily devoured by young worms, as young and tender leaves would be. From these facts I concluded that even if cutting the leaves were never so unobjectionable, it yet was a useless trouble, and I abandoned it altogether. Indeed, when I fed with white mulberry leaves, I even went so far as to gather the leaves by cutting off small branches and laying these on the hurdles with all the leaves on them; and this is by far the best plan, as the leaves keep fresh much longer—indeed, until they are entirely consumed, and allow the worms a much better and more natural position while feeding; as they get upon the branches, in all directions, they are not crowded upon a flat surface, but are supported by the branches. *They* prefer this plan to all others.

CLEARING THE HURDLES must be attended to, not at regular periods, but as often as the accumulation of filth and offal makes it necessary. The use of the net hurdles renders this not so often requisite, but still it must not be neglected, especially in damp weather; for it must be borne in mind, that nearly all the diseases of silk-worms proceed from foul hurdles. To clean the hurdles, all that is necessary is to lay over the worms some large fresh leaves in the morning, and as soon as the worms attach themselves to them, which they will immediately do, take the leaves by the stem, and lay them on a clean hurdle. In a few minutes a hurdle may thus be cleared of the worms, when the filth and offal may be thrown away, and the hurdle used for the reception of the worms from another; proceed in this way till all are cleared. It is a good plan to carry the filth to a distance from the laboratory; as, if deposited, as is too often done, *under the back window*, it may do just as much harm as it would if left on the hurdles.

FRESH LEAVES are essential to the health and vigor of the worms, and therefore great care must be observed that fermentation has not commenced, when they have been kept on hand some time, as is necessary in wet weather. Fermentation will be readily observed from the effluvium in the room, and also from the appearance of the leaves, which will exhibit dark-colored spots. When the least appearance of it is discovered, it were better to throw away the whole, than run the risk of injuring the worms. To prevent fermentation, cause the leaves to be well stirred about two or three times a day.

WET LEAVES, must in no case be given to the worms. They are almost certain to cause disease, and that of the most fatal character. I once lost a whole crop by this means. In wet weather, the leaves may be dried by spreading them about the room, and frequently shaking and stirring them about.

VERMIN, mice, ants, &c., must be guarded against. Mice devour silk-worms with wonderful avidity; and the bite of an ant is almost instant death to them. The only way to guard against mice, is to exclude them from the room by some means. Ants may be guarded against by not allowing the hurdles to touch the walls, and by surrounding the legs of the stands with small leaden troughs, filled with water. These are easily formed, and ought not to be neglected when these little pests are troublesome.

THE MOULTING, or changing the skin, takes place generally with the common silkworms, as above stated, and will be observed by the worms ceasing to eat. Generally all of the same day's hatching moult at the same time; and at these times they do not eat, but seem sick. All that is to be done is simply to leave them undisturbed. The food last given them will be left unconsumed, or only partially so. This forms convenient recesses for them to retire to for moulting. They remain

in this sickly state from 24 to 36 hours, and their recovery from it will be immediately observed by their activity, and increased size, and considerable change of color. They should be fed immediately with fresh leaves. The first and second change is so imperceptible as to require a close observer to discover them.

Strict attention to cleanliness, and ventilation. and undeviating regard to keeping a full supply of fresh leaves on the hurdles, are all that is meant by me when speaking of *care and attention.* If the above rules be completely carried out, the worms will begin to spin in from 25 to 28 days. If the worms are not thus carefully attended to, they will begin to spin at any time within 60 days, and then their cocoons will be the less valuable for every day their spinning is protracted beyond 30 days from the time of hatching.

THE AIR of the worms must always be kept sweet and pure. If from any cause whatever, a stench be observed, sprinkle the floor with a solution of chloride of lime, and set cups of it about the room. It is a good plan always to keep a stone jar of it sitting in one corner of the room, and frequently changing it to different places, even when no foul air or disease is present; for it is always better to prevent than to wait to cure diseases. All the diseases I ever discovered in silk-worms are readily cured by the free use of chloride of lime or soda. The *tripes* is a disease induced by foul air, and is closely analogous to the plague in the human species. I have known it to destroy a whole laboratory of worms, consisting of about 500,000, in one night; and have myself lost at one time about 100,000. Since, however, I discovered the preventive and curative powers of this most excellent article, I have never lost a worm by any disease. All that is necessary, usually, is to keep the chloride of lime in the room, as above stated, and occasionally sprinkling the floor with a solution of it. A table spoonful, put into a pint of water, is a good quantity to use. If, however, the disease has commenced its ravages, lose no time in removing the hurdles containing the diseased worms, from the room—then take half a pound or so of the chloride, put it into a gallon of water, sprinkle the floor well with it; put a spoonful of the chloride in each of several saucers, with a gill of water, and set the saucers about the room, particularly where the disease was first observed. As these diseases always, or at least generally, appear in damp, cloudy, or rainy weather, make a brisk blaze in the fire-places or stoves. Throw open all the windows and ventilators; and take care that all the filth, if any there be, be removed. In a few hours you will find the disease checked. If there are any dead worms on any of the hurdles, they must be removed forthwith.

Here I must be indulged with an explanation of a circumstance of a rather laughable nature, though it is as much at my own expense, as any body's else. It is in relation to the discovery of the valuable properties of chloride of lime, in preventing and curing disease in silk-worms. It is well known, that I have often claimed the *discovery* of this most valuable agent, and that some years ago a scientific *Frenchman* read a paper before a learned society in Paris, setting forth the important fact of its then recent discovery, and elucidating its great value to the silk growing interest. What will the public think of me, and of the Frenchman of science, and especially of the learned society of Paris, when informed, that we are NONE OF US entitled to the credit of discovery; that it is an old remedy—an old agent, used and recommended by Count Dandolo himself, whose writings we all of us had read, whose writings were and had long been familiar as household words to the savans of Paris! Yet, such is the fact, though I never was aware of it until this present writing, when I discovered it while looking over a translation of the writings of Dandolo in the Silk Manual, published by order of Congress, in 1828, in which work it will be found at page 119. The article chloride, it is true, is not mentioned by Dandolo at all, but its elementary principles are described and recommended, for the purifying of noxious air, very distinctly. I had often read the passage, and understood something of chemistry too, but never suspected that the combination of a portion from Dandolo's bottle of common salt and black oxide of manganese, and another of sulphuric acid, would produce chlorine gas. It is true, had I reflected a moment, I should have discovered it; but all of us are in the habit of considering things *themselves*, not the individual materials of which they are made. Hence my oversight, and of course that of the learned men of Paris. For my own part, I ask pardon of Dandolo for the claim I have heretofore set up to his property; but would recommend him to be a little more explicit in future, in his descriptions. But the fumigation of Dandolo, though it be chlorine gas, is not as good as the chloride of lime or of soda; as the gas evolved is not pure, but contains large portions of deleterious gases which are necessarily evolved with the chlorine. Besides the chlorides of lime and soda are infinitely more convenient, and even cheaper.

It seems necessary to recur to the *temperature* of the room, for the purpose of noticing an omission while treating on that head. In very high temperatures, the French recommend sprinkling the room with cold water, for the purpose of cooling it. I have often done injury by doing so, and recommend that it be not resorted to. It of course creates a dampness in the air, which is injurious and often dangerous. If the weather be dry, free ventilation is all that is necessary, where proper cleanliness is observed, let the weather be never so hot. Darkening the room, has a good effect in hot weather; and at no time must the sun be allowed to shine upon the worms. A *twilight* is preferred by the worms.

The worms will begin to spin cocoons from the 25th to the 35th days from the hatching, depending on the care with which they have been attended to. As before observed, if carelessly attended to, they may not begin before the 40th or 50th day; but generally the 35th day will be the time of commencement. Their readiness to spin will be immediately observed by their transparent, slightly amber color, by their ceasing to eat, and wandering about, leaving fibres of silk on the leaves, and by some of them actually beginning to spin cocoons among the leaves and rubbish on the hurdles, in the corners of the frames, &c. It is then necessary to prepare the *hedges* for them to spin on, or such other contrivance for the purpose as has been determined on.

The hedges for the worms to spin their cocoons

on are composed of various materials, and are as various in form. The French and Italians use brush of oak and various other kinds of trees, from which they construct hedges across the hurdles, resembling miniature bushes set close together in rows, and pressing against the hurdle alone. The worms climb these hedges, and spin their cocoons among the branches. I always used *broom-corn*, and found it to answer admirably. The seed is carefully to be combed off, the stalk cut off close to the commencement of the straw or brush; the top cut off square, and spread out, pressing against the upper hurdle or paper shelf, and the lower end resting upon the netting of the hurdle. Rooms of these set across the hurdles, six or eight inches apart, and as close together in the row as the tops will admit, answered the purpose with me. Of late, however, cocoon frames, made of laths, have been used, and with success, by many persons. I have never seen them, and am unable to give such a description of them as will enable the reader to construct them. Various other contrivances have been adopted, entirely different from either of the above, and even from each other; and, their authors assert, equally effectual for the purpose. These facts only prove that the silk-worms are not very particular as to where or on what they form their cocoons. They will, indeed, spin them any where; the only object to be attained by particular structures for them to spin on, is the prevention of waste of silk matter in forming the *outlines* of the cocoon. Where there is a space just large enough for the cocoon, very little silk will be wasted in the form of tow, or refuse silk. If the space be too large, the worm is compelled to reduce it, by filling it with loose fibres, to the proper dimensions for the cocoon.

As the worms on each hurdle begin to spin, the hedges, or whatever else is to be used, must be supplied; and the attendants should keep an eye upon the worms, to see that they all spin in the proper places. Some will not rise to the hedges or other places prepared for them, but commence spinning on the leaves in the corners of the hurdles, &c., they must be taken and placed upon the proper place. Observe that they do not get crowded too close in the hedges or other places, so that they will not each have room for a cocoon; for if they do, they will form *double cocoons*—that is, two or more will join in forming one cocoon, which is good for nothing, except for carding and spinning, as it cannot be reeled.

The worm is four days spinning its cocoon. Consequently they should be left perfectly undisturbed during four entire days after they commence spinning. On the fifth day after the whole have commenced, the hedges or other support of the cocoons may be taken down, and the cocoons taken off. Select the number of cocoons you may want for the production of eggs for next year, and prepare the others for reeling or for sale. If you can do so, the best way is to reel them at once; if not, the insect must be killed.

Various methods of killing the insect are in use. In France they bake the cocoons in an oven from which the batch of bread has just been drawn, or which has been heated for the purpose to about 150°. If too hot, the silk will be scorched, and thus ruined; if too cool, the insect will not be killed. In Italy they effect the object by exposing the cocoons to the hot sun for several days. Others kill them by filling a vessel containing them with hot steam; others with vapor of spirits. I have lately suggested that they may be effectually killed by the vapor of charcoal—carbonic acid gas—and for this purpose they may be carried into the *hatching room;* all the doors, and windows, and chimney of which must be perfectly closed. Dispose the cocoons about the room on the net hurdles, one above another, similar to the hurdles in the laboratory. Fill a common portable furnace with charcoal, and set it on fire; place it in the middle of the room, and close the room perfectly. In a short time the room will be completely filled with the deleterious gas, and must of necessity smother the chrysalis in the cocoons. I have heard of this plan having been tried in one instance only; but, in that, it was perfectly successful, and I have no doubt it will always be so. If it is, it is an important improvement, not only in saving much labor and time, as well as expense, in this part of the business, but in saving a great deal of trouble in reeling the cocoons, as it does not harden the gum, as all other processes do, and consequently they are easier to reel. Besides, there is no danger of injury to the silk, which is always more or less depreciated in value by the heat applied in killing the chrysalis. I am at present clearly of the opinion that this process will be universally adopted; but I have only *theory*, and one experiment, for the basis of this opinion. I am not now engaged in the business, and have no opportunity to make the necessary experiments. I would advise that a few cocoons be at first tried, say two or three pounds; that the cocoons thus tried should then be spread out in a warm airy room, for at least two weeks; if none of the *insects* come out, the result will be conclusive. The cocoons are now ready for reeling, or for sale.

Eggs for the next year's use are to be obtained as follows. Spread out the cocoons selected for the purpose on a large table, in any room that can be kept warm and comfortable, and that can be made dark. In about ten days from the time the cocoons were finished, the *moths*, or butterflies, as they are sometimes called, will perforate the cocoons, and come out. They will immediately couple, and are then to be taken in pairs, and placed upon the paper suspended for their accommodation, as described in the following paragraph.

Stretch a small cord across the room, about as high as your head, then two others, two and a-half feet apart, and one foot below the first cord, so that the first will be over the centre, between the lower ones. Then hang old newspapers over the cords, and pin them to both top and bottom cords. This will form a long range of papers, resembling the roofs of a long row of houses. As the moths couple, place them on these papers; take them by the wings between the thumb and fingers, as they will not be separated by it. You need not trouble them further; as after they separate, the female will commence laying eggs, and attaching them to the paper in a small spot about as large as a cent. Put moths enough on each paper to cover the whole sheet with eggs; but not so many as to compel them to lay their eggs on those already there, that is, to pile the eggs on top of each other. This they never do unless from necessity. After they have done laying eggs, the

moths generally die in a day or two; the males generally die soon after they separate. The moths do not eat. The recommendation of the French, to separate the moths after they have been coupled *six hours*, is perfect nonsense, and is one of the ridiculous refinements that refined people have tried to apply to the silk-culture, without the shadow of utility to recommend them, and only remarkable for the great additional labour and perplexity with which they encumber the business. Like all the other fooleries of the French, I tried this, and got for my pains no other result than a loss of about one-third of my eggs, which were *not fecundated*, as I might have expected. Let the moths remain together till they separate of themselves, and all your eggs will be good. The room where the cocoons and moths are should be kept nearly dark.

As soon as a sheet is filled with eggs, take it down, roll it up, and put it away in a cellar or an *ice-house*. They should be put in a *tin* or other metal box, to prevent mice and other vermin from eating them, and should be kept dry, to prevent mould and mildew. If it be desired to keep eggs to a late season the next summer, for the purpose of raising several crops, it is best to put the box of eggs, immediately after they are laid, into an ice-house, and keep them there till wanted. If they are only kept in a cellar till the next spring, and then put into the ice-house, they will hatch in the ice-house very nearly as soon as those exposed for hatching in a warm room. I once had more than a million hatched in this way, in the largest ice-house in Baltimore, the basket containing them sitting in the midst of the blocks of ice, under the straw. I do not even know that putting them in the ice-house immediately after they are laid, will prevent their hatching, but am informed that this has been the effect in several instances where it has been tried. For myself, I have no faith in the double or treble crop theory. I do not believe it will ever be profitably pursued. The natural time of hatching the eggs cannot in my opinion be either anticipated or postponed with complete success—at least I never was able to do so.

To estimate the number of cocoons you will want for a given number of eggs, all you have to do is to divide the number you want by 150—thus, if you want 100,000 eggs next year, or 2½ ounces, divide 100,000 by 150 and you have 667 as the number of cocoons required. It is true, the moths often lay more than 300 eggs, but you must allow for various circumstances that may diminish the number. I need not remark that it requires *two cocoons*, a male and female, to produce the 300 eggs—however, we allow 150 to each.

This essay may not be considered as full and minute in its details as desirable by some; but I believe I have described every thing necessary to the most profitable carrying on of the business. Many particulars contained in books, especially French books, are not noticed at all, for the simple reason, that I deem them useless, and do not wish to occupy the reader's time in useless criticisms. My next number will treat of the *reeling* of cocoons, &c., which will complete the series.

From the Magazine of Horticulture.

PROTECTION AGAINST HAIL-STORMS.

By A. J. Downing.

The *paragrele*, or hail-rod, appears to be scarcely known at present in this country. Hail-storms are undoubtedly much less frequent here than in the middle and south of Europe; but, nevertheless, some districts of the United States seem peculiarly liable to hail-storms in summer, and an account of the means at present in use on the continent of Europe to guard against such evils will be acceptable to many of the readers of this Magizine.

The paragrele, we believe, was first invented by M. Lapostolle, of Amiens. It has, however, been considerably improved by Professor Trollard, of Tarbes, whom we quote for authority for the following description from Berneaud's excellent *Manuel du Vigneron.*

"To make the hail-rod, a rope of straw is the first thing necessary; it must be made of ripe wheat straw, soaked and twisted, plaited with three strand and then with four ply, making twelve strand to the rope. This cable of straw must be twenty-five feet long, and through the centre there must run a strong twine of tow yarn: this cable of straw must be fastened at top and bottom to a stake of the same length, solidly fixed in the ground, and armed at the top with a metallic point of tin, *(latten,) with no iron.* The stake should be a pole of firm wood, entirely cleared of bark, which makes it liable to rot. The cable is fastened, at each end, by a wire of tin, or, what is better, red copper, and must be stretched tight, and tied to the pole, at intervals of every foot and a half, with the same wire. The tin point at the top should be one and a half inch thick and eight inches long, placed in direct contact with the tow yarn. The hail rods should be about six hundred feet apart, and fixed upon the most elevated points, such as the tops of hills, roofs of houses, or trunks of stout trees. The cost is about a franc a piece, (twenty cents,) and they last at least fifteen years."

These hail-rods, so simple in their construction, and easily obtained in every part of the country, have now, we believe, been in use nearly twenty years in France and Switzerland. Many extensive districts in both these countries, which formerly suffered severely from hail-storms, and in which the crops and vineyards were subject almost annually to great destruction, are, since the paragrele has been generally adopted, protected almost entirely against their desolating effects. The Linnæan Society of Paris, some time since, with a commendable zeal, made extensive inquiries in all parts of the continent respecting the utility of this instrument, and the result, as exhibited by them, proves the paragrele, in all districts liable to hail-storms, to be an invention truly invaluable. Public experiments were made in such parts of the country as were most subject to hail-showers, and while those districts where paragreles had been erected were quite protected, neighboring districts not guarded by these hail-rods, were, as before, much devastated. The society, drawing their conclusions from the facts elicited by the various trials made in France, estimated that the annual saving which would arise from the general adoption of the

paragrele, throughout that country, would not be less than five millions of dollars.

Considerable difference of opinion exists as to the method by which the paragrele produces its effects. A commonly received theory, based on the supposition that hail is produced by a congelation of the drops of water, in very elevated strata of the atmosphere, is, that the hail-rod, by attracting and detaining these vapors in a lower stratum than that in which freezing takes place, prevents its formation. But as hail-storms are generally accompanied by thunder and lightning, an American writer has suggested that the paragrele acts by abstracting the superabundance of electricity from highly charged clouds. The formation of hail, according to this writer, takes place only when, by the sudden passage of the electric fluid through the cloud, a portion of the water is decomposed, and returns into its original gaseous state, the heat abstracted (by the change from a liquid to an aeriform state,) from the neighboring particles (or clouds?) is so great as to convert them into ice, when they descend in the form of hail. The decomposition of a single cubic inch of water, according to the tables of *Biot*, will reduce the temperature of 5,64 pounds of water from 72 degs. to 32 degs., the freezing point of Fahrenheit. The decomposition of water by the electric spark is now a well known fact, but the peculiar manner in which electricity acts upon the clouds, or the exact manner in which they must be situated, in order that hail shall be produced, does not yet appear to us to be clearly demonstrated. That, however, the electric fluid is a necessary agent in the production of hail in summer, we can scarcely doubt; and the claims of the paragrele or hail-rod appear so well established, that we do not hesitate to recommend strongly the use of so valuable a means of protection in all parts of the Union liable to frequent or destructive hail storms.

Newburgh, N. Y., July 15, 1837.

From the Farmer and Gardener.

SMITH'S LIME-SPREADER.

We have before noticed the invention of a machine for spreading lime, by our ingenious fellow-citizen, *Francis H. Smith*, Esq., and revert to it again in consequence of the repeated applications that have, of late, been made to us for information as to its efficiency and cost. To speak then, first, of its efficiency. There is no doubt in our mind, and we believe there is none in the mind of any person who has seen it in operation, but that it is a most useful machine—one that is eminently calculated to promote the object for which it is intended, and that it not only economises time, but does the work better than it can possibly be done by hand.

One of the most desirable things aimed at in liming, is the *equal distribution* of the mineral over every part of the field, and this, it must be admitted by all candid persons, cannot be effected by shovel-spreading, as with all the care and precaution that may be taken, inequality will ensue in despite of the best directed efforts.

Again, it is almost impossible, by such spreading, to *regulate the quantity* sown on the acre, and hence disappointments often occur to the mortification and cost of farmers.

The injurious effects, too, of the old method of spreading, upon the lungs and eyes of those engaged in such work, have always been subjects of regret, if they have not restricted the use of this generous agent in the fertilization of the soil.

We are happy to say, that one and all of these objections have been completely obviated by Mr. Smith's machine, and that by it the following results are produced.

1. Owing to the beautiful and nice mathematical arrangement of the several parts of this machine, it is perfectly practicable to distribute any given quantity of lime evenly and equally over every part of the field; such is the equality of the operation that the ground after the work is done is covered with as much nicety as if the distribution had been effected by patient laborers from hand-sieves.

2. By the substitution of different cog-wheels, the machine may be so regulated as to spread 50, 75, 100 or 150 bushels of lime upon the acre, as may best suit the views of the farmer; and any of these quantities may be distributed with the greatest nicety and exactitude.

3. From the peculiar construction of the machinery, no disagreeable effects result to the workmen while engaged in their labor, as but little dust arises, and that which does, is left behind by the cart, so that the laborers are not at all incommoded thereby.

The above advantages we have pointed out, will, we are sure, be considered as important *desiderata* by all intelligent farmers; but independent of these, there is another of great moment. We allude to the superior despatch with which the work can be done. Two hands with a cart and horse, can spread *an acre* an hour, with perfect ease.

The reader, we hope, will be able to comprehend the principle and construction of the *spreader* on perusing the following description.

It is a neatly made *cart*, adapted to either one or two horses. In the bottom of it, about a foot in the rear of the axle, a hopper is formed, within which two rollers, reaching from side to side, revolve by means of cog-gearing, moved by a cog-wheel located upon one of the hubs. The rollers are made of iron, one of which is fluted to the depth of about three-fourths of an inch; the other is smooth, one of these rollers is borne upwards by a spring, which is of great strength, but which is so constructed as to give way, or recede back whenever a stone too hard to be crushed presents itself for passage between the rollers. This is an object of great value, as it not only provides against a stoppage of the machinery, and consequently saves time, but preserves the machinery itself from injury.

The machinery is *simple;* easily kept in order, and may be repaired by any common country *smith*.

It is calculated for spreading *lime*, either dry or wet, (stone or shell,) *ashes*, *marl*, or *ground bones*.

When not used as a *lime-spreader*, by fitting in a slide, which also accompanies the cart, it may be used for all other farm or market purposes.

The *price* of the cart, together with its machinery, including the two cylinders for *dry* and *wet* lime, is $110, a sum which should not be considered an object with any agriculturist who has a farm of a hundred acres or more to *lime*, as it would pay for itself in a single season in the

saving of labor, besides doing the work infinitely better than in the old way.

From the Mining Journal.

ANTI-DRY-ROT PROCESS.

The advantage arising from the application of Kyan's process for the preservation of timber, has been so generally acknowledged, and has been so well tested by experience, that its general introduction in the mining districts, is one of the natural consequences attendant on its success. It is now some months since it was first introduced in Cornwall, where its use is becoming very general; indeed, when the expense of timbering, shafts, and other uses to which timber is applied in mines, and the heavy cost attendant on works of this nature is considered, its importance must be apparent. In rail-way undertakings it is also adopted; and we learn with much satisfaction, that Earl Fitzwilliam has also ordered its use in the mines possessed by his lordship. This additional evidence of the estimation in which it is held, will, we feel assured, be hailed with satisfaction by all who take an interest in scientific discoveries like the present, and which, in the onset, had so much to contend with, not only from popular prejudice, but from the necessity of testing it by some years' experience.

From the Southern Telegraph.

MEXICO-EGYPTIAN COTTON.

A few days since we accidentally saw a very small quantity of the Mexico-Egyptian cotton, produced the present season on the plantation of the late Dr. Nutt, near this place. We were much pleased with the evident superiority of the article, and solicited* an account of the experiments by which this superiority was obtained. We are happy that our solicitations have elicited the very interesting letter which follows, and to which we invite the attention of our readers—especially that portion of them who are engaged in the production of our great staple. We have in our office, some specimens of this new article of cotton, which we will take great pleasure in showing to all who feel sufficient interest or curiosity to call upon us; and we hope there will be many such.

Messrs. Editors: You requested me to give you the result of an experiment instituted by the late Dr. Nutt, with the view of improving the growth of our cotton, by crossing it with that of Egypt. I cannot, as yet, give you the result, as the experiment cannot be fully carried out, until we have gathered the *small crop* of Egyptian cotton planted last spring; after which I may be able to show you what amount *per* acre it will produce, and to note particularly the relative advantages to be expected from the Mexican and Egyptian cotton. So far the experiment can only prove interesting to the curious. When we are more fully convinced of its usefulness, I will then inform you of the further progress of the investigation.

I learned from Dr. Nutt, that the cotton of the *Nile* seldom grows higher than *three feet*, that the bowls are small, and have only *three compartments*, containing as many *locks* of cotton. The Mexican cotton, as it grows with us, differs in each of these particulars. The stalk grows much higher; the bowls are larger, and usually have *five compartments*.

That these two *varieties* of cotton do cross when approximated, admits of no doubt when we have examined the *new product*, which is an amalgation of qualities peculiar to the Egyptian and Mexican, yet differing from both.

The seed Dr. Nutt brought from Egypt, was planted in a line contiguous to the Mexican cotton; the seed procured from these stalks were planted the following year, from which was obtained seed enough for something like an acre of ground—the subject of our present remarks.

This cotton was planted on the 14th of April, three weeks after the usual time. The consequence of this is, that it is still growing, and but very few bowls as yet have opened; and although the cotton on this place, as well as in the neighborhood, has suffered serious injury by the shedding of *forms* and *bowls*, yet this looks healthy and is weighed down by its rich burden.

The *Mexico-Egyptian cotton* as it now appears, has two or more stalks, measuring in circumference from eight to ten inches. These stalks have innumerable branches, which are larger than the stalks of common cotton growing in like situations. The stalks of each plant attain a common height, say from six to twelve feet. The branches grow erect, and these have arms that extend three or four feet horizontally; at every joint there is a blossom, square or bowl. Mr. H. Nutt had the curiosity to count them last summer. He found upon a single plant, *five hundred*. There is a plant now near the house, which, if any one had the patience to count, may be found as many *well-formed bowls*. The peculiarity of its blossom, is worthy of notice, which is a beautiful bright buff-color. The bowls have but *four compartments*, a feature given it by a compromise between its progenitors. The fibre of this cotton, (a sample of which I send you,) it will be readily seen, is *longer*, possessing *greater strength*—the color, *Mariet*, less bleached, approaching somewhat the much desired "cream-color," and that its texture is finer than the Mexican. This sample, you will mark too, was picked from a few bowls, the first to open, and that the seed were torn out by the fingers. You can conceive how much more beautiful it will appear when its second picking is ginned.

It is a fact, well attested by naturalists, that subjects of the *vegetable*, as well as the *animal kingdom*, when made to procreate from their respective species or families, degenerate. In a few years, the Mexican cotton of the Gulf Hills, which has so long occupied such enviable pre-eminence, may lose that proud title, and become as inferior as the *black seed* that preceded the introduction of the Mexican. Another fact may suggest to the planter the necessity of making some attempt to improve the culture of cotton in *the Hills*. You know, gentlemen, that land, which for a series of years, has produced a certain grain or crop, will become *tired*, and refuse at last to *bear* that crop any longer; that by changing the crop or alternating it with another, thus *resting* it in some degree, that its capability to produce will again be

* Dr. New.

restored. Now, there is no concealing the fact, that much of the land in *the Hills* is impoverished, and some entirely exhausted, and that, unless something is done to restore its productiveness, it will fail to bring good cotton before long, and at last fail to bring any cotton at all.

It was to remedy these evils, to wit: to prevent the degeneration of the Mexican cotton, and to arrest the exhaustion of the soil, that this attempt to cross the cotton has been made; and if the experiment of the Mexico-Egyptian cotton succeeds, we shall have the novel spectacle of worn out lands, *resting*, and, at the same time, *producing* finer cotton and larger crops than at present.

I sat down, to notice simply the peculiarities of this *mongrel cotton;* but your inquiries have elicited an extension of my remarks, which probably should have been reserved till better warranted by facts, or till my time should have given me leisure to render this communication more satisfactory. But as your curiosity *is to blame* for this hasty account of an interesting operation of nature, you must be satisfied with this statement till the future has developed the result of these speculations. Yours, respectfully,

C. B. NEW.

Laurel Hill, Sept. 5, 1838.

SUPERIOR PRODUCT OF THE TWIN CORN.

To the Editor of the Farmers' Register.

Old Point Comfort, Oct. 15, 1838.

Any thing connected with the mooted question of the prolific qualities of the Baden or twin corn, must be interesting to your agricultural readers. I will not undertake to settle the controversy; every one should be his own judge from his own experience; but, unless something unexpected occurs to change my opinion, I shall hereafter plant the twin corn, to the exclusion of all other varieties: this determination, is the result of a full and satisfactory experiment.

I planted, three years ago, a field of twin corn, adjoining one of our ordinary large white kind. The product, unfortunately, was not accurately determined, but I was satisfied, that it was greater than the latter. The overseer and negroes, however, condemned it, and I was compelled to relinquish its cultivation. I determined this year to give it another and a fairer experiment, and planted with it a lot of three acres, that was last year in our common corn, and yielded twenty-four barrels. The product this year was thirty-seven barrels of twin corn, upwards of 50 per cent. more than the yield of the previous year. The lot had received no manure, and, as it is fair to presume that it had lost a portion of its productive property by the previous crop, the advantage of soil was decidedly in favor of the first crop. The corn was planted both years alike, in rows five feet wide, and about one and a half feet in the step, and received, as nearly as could be, the same amount of cultivation. As one valuable property of the twin corn is to mature early, it suffered very little from the drought.

From the above facts, let every one draw his own conclusion. Mine is, that on rich land, there is no variety, that we know of, as productive as the twin corn.

Whilst I am writing, I will call your attention to an important typographical error in my communication of last month. Instead of "*several bushels,*" read "*seven barrels.*"*

R. ARCHER.

THE VERY LATEST AGRICULTURAL HUMBUG, ANNOUNCED IN THE VERY BEST MANNER.

From the N. Y. Commercial Advertiser.

Important to Farmers.—I think, Messrs. Printers, that we have had enough in all conscience of puffing and blowing about family Ravels, *Tree* play actors, men singers, and women singers, Italian fiddlers, and rope dancers, live elephants and monkeys. (By-the-by it is a very prevalent opinion at Cow Bay, Cow Neck, Oyster Bay and Hallet's Cove, that if all those drones were turned out to fell trees, grub up brush and hoe corn, we would not need to import peas-meal and rye-flour from Germany—things which feed the sense of sight only.) Now we, some of your clod-hopping subscribers, think ourselves entitled to half a column of your paper to speak of things which feed the taste, and give nourishment to the body corporate.

Mr. Jefferson says the man who makes three blades of grass grow where only one grew before, is more the friend of man than he who conquers kingdoms. I think if Mr. J. had always preached such sound doctrine, he would have been the greatest philosopher of the age. Seeing, then, that this proposition about the grass is self-evident fact, what think you should be done to the man who makes three ears of corn grow where only one grew before? inasmuch as grass feeds the horse, and corn the man. But to come to the point at once:

Some three years ago a merchant in New York, while emptying a box of tea, observed therein a few grains of corn. Concluding that corn from China must be something new under our sun, he had them planted, so they grew and multiplied. Last spring, I received from a worthy friend, a portion of said corn—it's a new variety—so I gave it the name of China's fall prolific, or tree corn; as it strikes off in two, three, and frequently four branches, in appearance like a small tree, and produces an ear at the head of each branch, whereas the common corn shoots out the ear from the side of the stalk; it grows from eight to ten feet high, produces an abundance of fodder, and is a large white flint twelve rows long, and ears from ten to fourteen inches long. I counted six hundred and sixty grains on the ear; it was planted on the 10th of May, and had ears fit to boil on the 10th of July. Its produce was curtailed by the long drought, but notwithstanding I counted two thousand one hundred and twenty grains, the product of one stalk: being an increase of two thousand and one. The Dutton (which is an excellent corn) planted on the same day, on the same field, and received the same quantity of manure, cross ploughed and hoeing, did not produce one half. The patch about two hundred hills,

* This was indeed an important error, and which our readers are requested to correct in their copies.—ED

was examined by many respectable farmers, who all pronounced it something new, and something superior.

The corn may be had of G. C. Thorburn, New York, and at the store of Wm. Thorburn of Albany, price 25 cents per ear; the net profits to be given to some of the charitable institutions in New York and Albany. Now, if there is a farmer between Maine and the Rocky Mountains who would rather pay 25 cents for two gills of brandy, than to buy one ear of this corn, which will plant 100 hills—I say, if there is a man, he ought to be fed on nothing but supaun and buttermilk as long as his little soul and big carcass will hang together. A stalk, having the ears on, to show the manner of growth, may be seen at the above stores.

☞ Every printer in Kings, Queens, Dutchess, Orange, and Albany counties, who is fond of *Jennie cake*—(for if my informant speaks true, it took its name from a Southern lass by the name of Jennie Dawson, who was famous for manufacturing this delicious article; but that at a meeting of the Bachelor's Club, Jennie was voted out and Johnny put in her place—I only hope that some of those chaps who were concerned in an affair so ungallant, may never taste one of those new made cakes, when well anointed with fresh butter)—will please insert as much of this long winded story as they see fit; and every printer who has children, who ere long may be orphans, will please insert the whole, and place it to the credit of the widow and the fatherless—he who is their Judge will register the thing in Heaven, as Uncle Toby says. GRANT THORBURN.

Hallet's Cove, Sept. 24, 1838.

We take the earliest opportunity which the time of our publication offers, to give additional circulation to the foregoing communication; and to award to it our praise of its being the most admirable, as well as the newest specimen which we have met with, among the annunciations and puffs of agricultural humbugs. Readers, of almost every description, are like to be induced to read the article, by some one of its attractive points. First, the general heading, of "important to farmers," though so often falsely and foolishly used, is very sure to attract, at least, a cursory glance from every one of the profession; and then the attention will be held by the little matter of narrative—by the slip-shod and familiar gossiping manner of the writer—the novelty of the article described—and confidence in the truth and disinterestedness of the writer will be fixed, and the reader entirely captivated, by the noble offer of giving the profits, (*net profits*, mark you,) to some charitable institution. Now, on this point, we will merely observe, *en passant*, that if the charges of all expenses of agency, commissions, &c., &c., &c., such as are often made, and may be made without question in this case, do not serve to give the lion's share of the profits to the salesman, and benevolent discoverer of the merits, of the Chinese corn, then he understands less of his business than we give him credit for.

But with all the merit of Mr. Thorburn's laudatory annunciation, we must say, that in one particular it is very deficient—astonishingly so, when it is considered that Mr. Thorburn is so old and well experienced in his business. He has certainly lost the chance of increasing his purchasers ten-fold in number, and his profits, (gross and perhaps "net" also,) by his charging so low a price as 25 cents per ear for his corn. According to all the rules of humbug, he ought to have charged 25 cents *per grain;* and the eagerness of purchasers would have been increased in the ratio of the difference of price. On the contrary, if he had asked only $1 the bushel, or offered to give away single ears, very few persons would care to try the planting.

So much for the annunciation. Of the corn itself, it may, or it may not, be a good kind. It would be as presumptuous in us, upon this statement, to pronounce it of no greater value than the ordinary kinds, as it is in Mr. Thorburn to assume so much value for it, upon his few facts, and very slight experience of its growth. We merely *believe* that it is of no superior value to other kinds, except, like spring wheat, as a humbug; but do not pretend to *know* it. But we deny that the product of 2120 grains from the several ears of a single stalk, on garden culture, is any proof of its superiority, or great value, as a field crop. Such a product of particular stalks on rich land, is not very rare here, and probably of grains larger than the "Chinese." Of a particular kind, called the "Georgia gourd-seed corn," we have heard of, (and believe we have counted, some twenty years ago,) more than 2,000 grains upon a single ear; and for aught that we know, the stalk might have borne more than one ear. At least we know that some ears had as many as thirty-six rows; and the largest, when just ripe, would yield very nearly a quart of grains. This kind of corn united several of the requisites considered so important by fancy-variety-corn-culturists. The ears, when well made, were not only enormously large, and the number of rows and of grains very great, but the grains were very deep (or long) and the cob very large, so as to hold so great a number of grains. We remember well the delight with which we received a few ears of this mammoth corn, and the care with which it was planted, by single grains, and at wide distance, on the richest spot of a good field. Yet the returns, tried for two years, proved that it was very unproductive (for this climate) in measure; and, in all respects, it was the worst kind of southern corn we had ever tried. Yet what a glorious subject would this very corn furnish for a successful humbug, in such good hands as those of Mr. Grant Thorburn!

We see that the editors of newspapers are already helping Mr. Thorburn handsomely in his appeal for the widow and orphan, by re-publishing his letter. The editor of the 'Sun,' however, out-strips all his brethren, and even Mr. Thorburn himself, in commendation. He closes an account of the letter and its subject, with the following sentence. "It is considered as much superior to our corn, *as the morus multicaulis, or Chinese mulberry, is to that of the American tree.*" Aha! Mr. Thorburn! "*Chinese* corn" was a lucky name, and its application highly creditable to your judgment. There is now a fascinating power in the word "Chinese;" and there is no knowing how large a "Chinese corn" bubble might be blown, be-

fore its bursting at next gathering season, but for the committing the grand blunder of not charging 25 cents a grain for the seed!

From Brewster's Journal, 1830.

VILLAGE LIGHTED BY NATURAL GAS.

The village of Fredonia, in the western part of the state of New York, presents this singular phenomenon. I was detained there a day in October of last year, and had an opportunity of examining it at leisure. The village is forty miles from Buffalo, and about two from Lake Erie; a small but rapid stream, called the Canadoway passes through it, and after turning several mills discharges itself into the lake below; near the mouth is a small harbor with a light-house. While removing an old mill which stood partly over this stream in Fredonia, three years since, some bubbles were observed to break frequently from the water, and on trial were found to be inflammable. A company was formed, and a hole an inch and a-half in diameter, being bored through the rock, a soft fetid limestone, the gas left its natural channel and ascended through this. A gasometer was then constructed, with a small house for its protection, and pipes being laid, the gas is conveyed through the whole village. One hundred lights are fed from it more or less, at an expense of one dollar and a-half yearly for each. The flame is large, but not so strong or brilliant as that from gas in our cities; it is, however, in high favor with the inhabitants. The gasometer, I found on measurement, collected eighty-eight cubic feet in twelve hours during the day; but the man who has charge of it told me that more might be procured with a larger apparatus. About a mile from the village, and in the same stream, it comes up in quantities four or five times as great. The contractor for the light-house purchased the right to it, and laid pipes to the lake; but found it impossible to make it descend, the difference in elevation being very great. It preferred its own natural channels, and bubbled up beyond the reach of his gasometer. The gas is carburetted hydrogen, and is supposed to come from beds of bituminous coal; the only rock visible, however, here, and to a great extent on both sides along the southern shore of the lake, is fetid limestone.

From the London Farmer's Magazine, August, 1838.

WHAT QUANTITY OF MANURE SHOULD BE APPLIED TO THE ACRE?

The answer to this question involves many considerations which preclude a definitive reply, such as the condition of the land, the quality of the manure, and the kind of crop. Too much, as well as too little manure may be applied. What would be beneficial for an autumn-ripening, or hoed crop, would be prejudicial to a small grain, or summer-ripening crop, and more particularly if the manure is applied in an unfermented state, and be withal a waste of fertilizing matter. Twenty tons to the acre would not be too much for corn, potatoes, ruta baga, &c., if applied broadcast, and plouged in; but, if long manure, and applied in the drill, or hill, and a dry season should ensue, it might prove an injury; and if this quantity of long, or even short manure, were applied to the acre of small spring grain, it would probably cause a flush of straw, likely to be affected with rust, at the expense of the more valuable part—the grain. Dr. Coventry, late professor of agriculture in the University of Edinburgh, whose business and study it was to collect data, and make correct deductions in this and other agricultural matters, was of the opinion, that from four to five tons are yearly requisite to keep up the fertility of a soil of the kind usually denominated spit, or tolerably rotted dug; and this supply he thinks a well managed farm may be made to produce. To show how this quantity may be obtained, and how it should be applied, we quote from Mr. Youatt, the writer of British Husbandry.

"According to that calculation," says our author, "it must be observed, that the course of crops is supposed to consist—on light soils, of the alternate plan of corn and green crops, (see New System of Husbandry,)—on clays which do not admit of that system, that the holding contain a proportionate quantity of grass land; and that the quantity of manure should be supplied not in small quantities annually, but in large ones, at intermediate distances of four, five and six years. Light soils, in the common course of husbandry, rarely require the application of putrescent manure oftener than once in four years, and in all cases where the clover is allowed to stand two seasons, it may be deferred without disadvantage for another year. Heavy soils may run six years without it, provided that the land be laid one year in fallow, and that there be sufficient meadow to be reckoned at least one crop in the course. It being, however, clearly understood, that--whether on light or heavy land—nothing but grain, seed and live stock is to be sold off the farm, unless replaced with an equal portion of purchased dung; that the whole of the green crops; the haum of pulse, and the straw of corn, be used in the most economical manner; and that some of the live stock be either soiled or fattened upon oilcake, which plan, if carefully pursued on good soils, with capital sufficient to secure an abundant working and fattening stock of cattle, ought, under fair management, to furnish an adequate supply of dung for any of the usual courses of culture."

Having thus submitted to our readers all that occurs to us of importance on the subject of farm-yard manure, we shall here recapitulate a summary of the chief points which we deem particularly worthy of their consideration:

1. To bottom the farm-yard with furze, fern, dry haum, (stubble, &c.) or any other loose refuse that takes the longest time to dissolve; and over that to bed it deep with straw.

2. To occasionally remove the cribs of store cattle to different parts of the straw-yard, in order that their dung may be dropped, and their litter trodden, equally.

3. To spread the dung of other animals, when thrown into the yards in equal layers over every part.

4. To remove the dung from the yard at least once, or oftener, during the winter, to the mixen.

5. To turn and mix all dung-hills, until the woody fibrous texture of the matter contained in them,

and the roots and seeds of weeds, be completely decomposed, and until they emit a foul putrid smell, by which time they reach their greatest degree of strength, and arrive at the state of spit-dung.

6. To keep the dung in an equal state of moisture, so as to prevent any portion of the heap from becoming fire-fanged. If the fermentation be too rapid, heavy watering will abate the heat; but it will afterwards revive with increased force, unless the heap be either trodden firmly down or covered with mould to exclude the air.

7. To ferment the dung, if to be laid upon arable land during the autumn, in a much less degree than that to be applied before a spring sowing.

8. To lay a larger quantity on cold and wet lands than on those of a lighter nature, because the former require to be corrected by the warmth of the dung, while, on dry, sandy, and gravelly soils, the application of too much dung is apt to burn up the plants. Stiff land will also be loosened by the undecayed fibres of long dung, which, although its putrefaction will thus be retarded, and its fertilizing power delayed, will yet ultimately afford nourishment.

9. To form composts with dung, or other animal and vegetable substances, and earth, for application to light soils.

10. To spread the manure upon the land, when carried to the field, with the least possible delay; and, if laid upon arable, to turn it immediately into the soil.

11. To preserve the drainage from stables and dung-hills in every possible way, and, if not applied in a liquid state, to throw it again upon the mixen.

12. To try experiments, during a series of years, upon the same soils and crops, with equal quantities of dung, laid on fresh, and afterwards rotted; in order to ascertain the result of their application to the land. The whole quantity to be first weighed or measured, and then divided.

The fermentation of farm yard manure is, in fact, a subject of far greater importance than is generally imagined, for on a due estimation of its value mainly depends the individual success, as well as the national prosperity of our agriculture. The experiments to which we point, cannot therefore, fail to come home to the interests of every man; they may be made without expense, and without any other trouble than the mere exercise of common observation and intelligence. Leaving, however, aside the discussion concerning the disputed worth of fresh or fermented—of long or short dung—let the farmer sedulously bend his attention to the accumulation of the utmost quantity that it may be in his power to procure. The manner and the time of using it, in either state, must, however, be governed by circumstances which may not always be within his control; and every judicious husbandman will rather accommodate himself to the exigency of the case than adhere strictly to his own notions of what he conceives to be the best practice. In fine, whether favoring the one or the other side of the question, let him collect all he can, apply it carefully to his crops, and then trusting to events, "*let the land and the muck settle it.*"

SCRAPS OF INFORMATION IN REGARD TO THE CULTURE OF THE CHINESE MULBERRY.

In the present unparalleled and general excitement, in regard to the speculations in purchasing, and intended culture of the morus multicaulis, no apology need be offered to our readers for giving to that, and to kindred subjects, so much space in this publication. Indeed, whether viewed as a valuable future improvement in the agriculture and industry of this country, or as a subject of national mania, the subject is one of intense interest to almost all who read agricultural publications, and to even most persons who read nothing. Almost every one of our subscribers, stimulated by some one or other motive, will desire to cultivate at least a few plants; and all are but slightly informed on the subject. Therefore, in addition to the valuable general directions for the culture given by G. B. Smith, Esq., in the last No. we shall add here some interesting extracts from several private letters from T. S. Pleasants, an extensive cultivator of some experience, and whose general intelligence, and correctness of observation, deserve the fullest confidence. These letters were designed only for our own perusal and use; but considering the suggestions as interesting, and likely to be useful to many others, we have asked and obtained permission to share the benefit with our readers.

To these extracts will be added other scraps of information received from various sources, and principally from the Rev. Sidney Weller, of Halifax county, N. C.

It is gratifying that the favors of fortune, in this sudden and surprising mulberry madness, have fallen in some cases upon most worthy receivers; and there are none in whose successful and profitable cultivation we are more gratified, than in the cases of the individuals named above. In general, these unexpected visitations of good fortune have fallen upon a class of cultivators, who usually work more for the public benefit than their own, and whose improvements, or schemes, subject them always to ridicule, and often to loss. These are the book-farmers and experiment-makers—*and especially the regular and devoted readers of the Farmers' Register, or other agricultural periodicals.* To this last fact we desire particularly to call attention; and would be much benefited if it could be presented fully to the view of all who have made nothing from this golden harvest, simply because they had read nothing concerning the cultivation which has produced it.

We shall take the liberty of speaking more fully of Mr. Weller's case, because it is one of peculiar interest. He settled himself on a piece of miserably poor land, and with very little prospect, as

his neighbors thought, to make a bare subsistence from its products. He has devoted himself principally to vine and multicaulis culture. Some notices of his useful services to agriculture, in the former department, have been heretofore given in this publication. Of the latter, the principal circumstances are as follows: Five or six years ago, being then, and long before, a regular reader of the American Farmer, he was induced by its recommendations (all of which we owe to its former editor, Gideon B. Smith,) to begin the cultivation of the multicaulis. He bought of J. J. Hitchcock, of Baltimore, a plant of about a foot in height, for which he paid a dollar; and 25 cents more for getting it to his residence. From this small beginning, all his stock, and many other, now large stocks, bought from him, have grown. Mr. Weller's sales of plants, before this season of speculation and high prices had commenced, amounted to about $2000; and, this fall, to $8000 more, though made at 6 cents the foot, and before the rise to half the present current prices—besides reserving enough stock to double or treble his crop next year.

Let it not be supposed from these or any other statements of enormous profits from raising multicaulis plants, that we design to have inferred as our opinion, that we expect them to continue. The greater part of the present price of multicaulis is undoubtedly a bubble, blown up by speculation; and that part must burst, sooner or later, (when, we cannot predict;) but the *intrinsic* value of the plant will remain; and if silk-culture should be really undertaken by only one farmer in every hundred, and the demand thereby created should maintain, for two seasons, the plants and buds to one-eighth (or perhaps one-sixteenth) part of their present exorbitant prices, the cultivation will still be highly profitable to all who plant even at the present high prices. If there should be *no demand* of purchasers, and *no design of the cultivator to raise silk-worms*, then of course he will lose his whole outlay. Of these, or of better chances, every adventurer must judge for himself.

We proceed to give extracts from our friend Pleasants' letters. *He* will not confine his efforts to merely raising mulberry plants for sale, but will feed silk-worms the next season, on a considerable scale. For this purpose, he has acquired possession of the Bellona Arsenal, in Chesterfield, which will be converted from its late warlike name and purpose, to a laboratory for the peaceful and useful labors of silk-culture, under the direction of its present worthy occupant.

* * * * *

"On the subject of *one-bud cuttings* of multicaulis, I can give thee my experience this year, which perhaps may be of some value. It is probably known to thee, that with scarcely any exceptions, there was a great failure in getting cuttings to start last spring. John Carter is the only cultivator I know who has succeeded well. Next to him, I place myself—but at a considerable distance in the rear. To the north, not more than one in 15 or 20 grew. The failure was owing to a most peculiar season, for I never saw cuttings start better than mine did. An excessive drought, at the time the plants began to root, dried them up. In preparing my cuttings, out of some of the strongest and best wood, I cut 10,000 or 15,000 with one bud. The remainder had two buds. The one-bud cuttings I planted to themselves in the same sort of ground with the others; and they were all subsequently treated alike. Taking the piece at large, they stand as well as the best spot of two-bud cuttings, and much better than the greater part of them. They come up with great regularity, and have grown off very evenly.

"If the season is propitious, there is no reason why a cutting with one bud should not grow as well as one with two buds. A large one may be stuck deeper in the ground, and in a drought, it may be longer under the influence of moisture. But with *early planting*, I have no hesitation in relying upon any good one-bud cutting; and early planting, by the way, is more or less important to the success of every mode. I have never taken up my multicaulis plants so early in the spring, but what I found the buds started, and the little rootlets in the act of being thrown out. The growth must therefore be checked by exposure to the air, and transplanting. From my observation, the conditions which I would recommend, (and which I rely on so fully that I intend to practice them,) in order to insure success to one-buds, are as follows: Preserve the plants during winter in a cool place, not exposed to the sun. Let the ground be prepared, so that the planting may be commenced as early as the season will permit; if in February the better—at any rate, early in March. The soil should not be so light or sandy as to become thirsty very soon. Let the cuttings be prepared by separating midway between the joints, and stick them deep enough for the bud to be covered from an inch to an inch and a half, according to the texture of the soil. The bottom of the slip will then be about 2½ inches beneath the surface—a depth to which the ground seldom becomes entirely dry in the early part of the spring—and if there be any choice of ground in the lot, select for single buds that part which lies the lowest, as being likely to retain moisture the longest. With these precautions, and above all, *early* planting, no failure can, in my opinion, ensue; but I would advise thee to consult other cultivators on the subject. By a strong cutting, I mean one taken from the larger part of the main stem of a vigorous plant, and those near the base of thrifty lateral branches. Some days ago, I removed the earth from a number of my single-bud plants, for the purpose of examining them carefully. I found some smaller than I intended to plant; but the trees were as large as those from the largest cuttings. * * * * *

"My plants will this year yield *per cutting* about 40 buds, on the average—perhaps more; and the most of them grow on a thin, shallow soil, that never was manured." * * * * * *

"It is the opinion of many men of judgment, with whom I have conversed and corresponded, that the present prices will be nearly or quite sustained another year. The stock of mulberries

is not so large as one might suppose. There are very few in New England. A friend in Baltimore informs me that G. B. Smith estimates the number in the United States at two and a half millions. Robt. Sinclair (perhaps in conjunction with Smith,) states the same number; and a friend of mine, who has taken great pains to inform himself, has arrived at precisely the same conclusion. I cannot help thinking there are more; but my information on the subject is not extensive. In regard to the demand, I may say that, in addition to that indicated by the present high prices, Judge Comstock, editor of the Silk Culturist, told me he did not think there were more in the United States than would supply the state of Connecticut, at fair prices, if they were all sent there. And a gentleman of Burlington informed me that there were not more than enough in New Jersey to supply the present demand in the county of Burlington in the same manner.

"I intended to have said a word about sprouting cuttings in a hot bed, as recommended by G. B. Smith. I have only tried it once, and then on a small scale; but I did not succeed very well. The objection is, that the plants become chilled and stunted by removal from such comfortable quarters, to be exposed to the inclemencies of the month of May. But in any event, great skill and attention are requisite in the management of a hot bed.

"It may be very familiar to thee, but it will do no harm to add, that the most convenient instrument in preparing the cuttings, is a pair of pruning scissors—such as are used by vine dressers."

* * * * *

"I had intended to supply an omission made in regard to the preparation of cuttings; and the remark I would make, applies especially to cuttings of single buds. It is the main stem that I recommended to be cut into single buds, and it is the strongest part of the stem that throws out the lateral branches. As every lateral starts out, there is no bud (at least none that will readily grow,) remaining at the joint; and it is therefore necessary, in preparing the cuttings, that the lowest bud on the lateral should be left to the main stem. I lost many plants last spring by not attending to this. And the sellers of mulberries, who supply *trimmed* plants, should always prune in this way; otherwise, the best portion of the wood on the whole plant will be of little value.

"I have almost determined to plant a portion of our cuttings *this fall;* say about the last of Nov. or 1st of December. The slightest covering of earth, I have always found to be sufficient to protect them during winter. If thou hast noticed the plants in the spring, when they are uncovered for the purpose of planting, especially if it be not very early, thou hast no doubt observed that every good bud has sprung. By exposure to the dry air, many of them perish before they are planted. Had they remained under a proper depth of soil, every bud, starting as they do at the same time, would have shown itself above the ground. Why cannot they be protected in the field equally as well, without being subjected to spring handling and removal? It would be an easy matter to cover the stems in the furrows 2 or 3, or even 4 inches deep, and remove the covering in the spring, which would be a good working. I have been thinking all the summer I would plant a portion of my crop in this way; but I should be afraid to recommend it strongly to others, lest there might be a failure. If, however, it should succeed as well as I am convinced it would, almost every bud would produce a tree; and by vegetating earlier, it would produce a much finer tree than by the common mode. I perceive that Cheney, who is a very experienced cultivator, recommends that *layers* should be planted in the fall. At all events, I know from experience that the earliest spring planting is much to be preferred to deferring it until the ground becomes somewhat warm. Like grains of early planted corn, the cuttings are throwing out roots, though the germ may not appear above ground, much sooner than the late planting. Unless the ground was clean, there might be danger from the field mice. Please to give me thy views on this subject.

"Wilt thou take it amiss, if I venture to assign one or two reasons why thou shouldst not offer thy plants of 1839 for 12½ cents, as thou didst propose doing some time ago? I would not deter thee from doing so, for the purpose of keeping up the price. If they do not sell for more than 9d. I shall be perfectly satisfied. It is enough for them. But can any one individual reduce the market price by offering his crop at reduced rates, or even by giving them away? Perhaps thou mayest grow a million. If there be a brisk demand for 20 millions, which will probably be the extent of the supply next year, a million more or less will have very little effect upon prices. By contracting now to receive much less than they will probably command, thy efforts to reduce the prices will be unavailing, and thou wilt be voluntarily depriving thyself of the profits to be derived from the culture. Speculators, also, might buy up thy whole crop, and retail it at greatly advanced rates. Indeed it is only the speculator, perhaps, that would now contract to receive plants to be delivered a year hence. So that I see no probability of thy effecting thy object by this course. It is however very possible that by another year, public feeling on the subject may be more rational, and that prices may correspond with the actual value of the plant for the purpose for which it was designed by nature. We are now going through the paroxysm of the fever; in due time it will abate, health will be restored, and reason resume her empire. Let us wait patiently for it, and do all we can to promote the culture of silk, until the question is settled whether or not it can be introduced into this country as a profitable branch of agriculture."

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"I think I have obtained some valuable information respecting the action of bone manure in growing mulberries. When I was at the north, I inquired particularly about its general value, at Boston, Philadelphia and Baltimore. At Boston, there is a very large manufactory. At all three places, the price for crushed bones is 35 cts. per bushel. I purchased 200 or 300 bushels in Baltimore; but it was not until after I left there, that I heard of its good effects on mulberries. A grower in Burlington had applied some to a small lot of ground; and the effect was so beneficial, that I heard the trees spoken of as being the finest in the whole country. They had tried to keep the knowledge of it a secret there, for their own advantage; but I intend that it shall be known. I am promised the result of another experiment. I am fully convinced that with the use of $5 worth of bone manure to the acre, our highest and driest,

and poorest lands may be made to produce trees 5 or 6, or 7 feet high.

"Please inform me what was Sydney Weller's mode of saving his immature cuttings. I heard thee detail it, but perhaps I have forgotten some part."

In answer to the foregoing inquiry, and for the benefit of all others of our readers, the information derived from Mr. Weller's statement of his practice will here be given.

All who have observed the morus multicaulis, know that the plants of one year's growth have a large proportion of the latest formed stem and branches so green and tender as to be unfit to withstand severe frosts. This part of the plants, (with all the buds thereon, though frequently amounting to one-fifth, or more, of the whole number on the plant,) has, until lately, been deemed worthless, and taken no account of in sales, or in planting. But in our own small practice, it was observed last spring, when the plants were taken out of the earth under which they had been kept through winter, that the unripe buds, to the very extremities of the twigs, had begun to start in growth, and of course that they possessed enough vital power to produce plants, if properly managed. The proportion of unripe wood this year is unusually great, owing to the early and continued drought of summer having been followed by abundant late rains. After the first year, there is very little of the wood left unripe, as the branches generally ripen to the ends.

Mr. Weller had earlier learned the vital power and value of these unripe buds, and has practised with success the following manner of saving them separately. As soon as there has been frost enough for the leaves to fall off, and before any more severe cold weather follows, all the unripe ends of branches and stems are cut off, including about an inch, or one bud, of the adjoining ripe wood below. These are laid in a shallow pit or trench, or even on the cleanly scraped surface of the earth, so as not to be more than four inches thick; and then are covered over with clean and friable soil, (sand would be better,) which is to fill up all vacancies between the twigs, as well as to cover them. Then, any kind of earth may be heaped on, so as to cover the twigs 12 or 18 inches deep, if freezing is feared; though a few inches depth has always proved sufficient. As in all other cases of winter-pits or trenches to contain multicaulis plants, the access of too much water from rains should be prevented, by choosing an elevated spot, or surrounding it with a ditch. Mr. Pleasants' views and advice as to choosing a *cold* situation, to prevent the too early springing of the buds, are likely to give still greater value to this practice of saving and using unripe buds. Mr. Weller relies on his unripe buds, saved as above, to be nearly as certain as the ripest, to vegetate and produce well; and this information may be worth several hundreds of dollars, this year, to every one who has as much as an acre in multicaulis plants. It is highly necessary to avoid having any vegetable matter in contact with the buried twigs; as mouldiness and rotting will be produced, and perhaps may spread beyond the twigs first affected.

As to the capacity of the unripe buds to germinate and to produce good plants, if preserved properly through winter, (without being cut from the plants,) we knew it likewise from the information of John E. Meade, esq., of Prince George, who availed of the knowledge so well that he has now as many growing trees as he bought cuttings last spring—the unripe buds, which were not charged, having fully made up for all the failures of the ripe. By the way, the cuttings bought by Mr. Meade last spring, cost him (at an unusually low price) $10, and the crop from them is worth $1000, at the present enormous prices and ready sales.

We saw Mr. Weller's nursery, (in Halifax county, N. C.,) on October 16th. Tender plants, (such as sweet potato vines,) had then been partly killed by frost, but his mulberries were barely touched, on some of the youngest top leaves, and may grow, or ripen, much more yet. He had worked the ground as late as in August; and that, (as we think, improperly late cultivation,) as well as the late rains, had caused a very late growth, and an unusually large proportion of unripe wood and buds. He does not trouble himself to cut down and cover, or to use any other means to protect in winter, any of his plants, except the unripe extremities of branches. He considers all the ripe wood as perfectly safe. This is a most important advantage of the climate of North Carolina and Virginia. But though cutting down the entire plant is unnecessary to protect the ripe wood from cold, still as it will be done at any rate, for cuttings, while the great demand lasts, it will be better to cut off and bury the entire stems and tops, to better protect the unripe buds.

Mr. Weller's nursery ground is quite sandy, and it had been very poor, and most of it is now far from rich. Yet his one-year's plants are generally four and sometimes six feet high; showing the great advantage of using the lightest soil. At Gaston, on the rich as well as light soil of the Roanoke low-grounds, a small patch, belonging to W. W. Wilkins, esq., would average certainly 150 good buds, (and he thinks 200) on the plants of this year's growth. It is certainly the finest growth we have seen. These plants, from buds planted last spring, in seven months thereafter would readily sell for $3 a-piece—perhaps for $5, at the present prices. Some waste building lime had been given to this spot. We had been before inclined to believe that calcareous manures are

peculiarly adapted to the mulberry, from having observed the usual locations, and degree of luxuriance, of the native growth. Mr. Weller has found very decided benefit from sprinkling the rubbish of old mortar, (from demolished brick-work,) in his rows of multicaulis cuttings. The great value, too, of bone-manure, (though bones are of phosphate of lime,) as stated by Mr. Pleasants, is a valuable fact, and helping to confirm the opinion of the demand of this plant for lime in some of its forms of combination.

Mr. Weller plants at any time in winter or spring, when he has the time. He has no objection to, or fear of, fall planting, but has no spare labor at that season. He cuts up, generally, into single-bud cuttings, and drops the bits into the furrow, with no care as to their position, and about seven or eight inches apart, (rows three feet) and covers carefully. We think a better mode would be to stick the lower end of the cutting into the soft mould, perpendicularly, and to cover the bud not more than an inch, if near the time to sprout. The lower extremities, where the roots form, in this case would be as low as possible, and so much the more likely to keep moist; and the bud be very near, as it ought to be, to the air. These objects will be still the better answered, by cutting the branches as close *above* each bud as is safe, and of course giving as much length as possible of each cutting *below* the bud.

Besides the rapid mode of propagation from single-bud cuttings, when they are allowed to have the growth of an entire season, there is another process which may be added, and by which the product may be still more and greatly multiplied. This is by *summer layers;* which mode is extensively practised by some of the largest dealers and nurserymen, and which is certainly an admirable means of making profit by imposing on distant and ignorant purchasers, still more than to obtain the legitimate gain of the actual increase of the stock of plants. As described to us, the following is the most approved and productive plan of raising from layers. Early in July, or as soon as the young shoots are 10 to 15 inches high, let each be bent down and laid on the earth, and confined there by a forked stick, and a little earth be laid on one of the buds near the extremity. The leaves of the buried buds should be cut off. From there roots soon strike out, and each extremity runs up rapidly into what northern nurserymen call "a tree." Soon after the first operation, every alternate bud, of the stem laid down, should be covered with earth in like manner; and from each of the intermediate buds, left uncovered, there will be thrown up other upright shoots, of which the connecting original stem may be cut apart, before the growing season is over, and thus form so many of what are termed "rooted and *untrimmed* trees," and sold as such, formerly at 25 to 38, and now at 60 cents or more, a-piece. In this manner, in a good season, and during rapid growth, we are informed that sometimes six, or eight, and even ten "rooted trees," may be raised in a year from a single bud planted the same season. This is a very useful practice to increase a small stock rapidly; as these secondary, though very inferior plants, if well preserved through winter, will furnish a greatly increased stock of buds and roots for the next year's planting. But *to sell* these plants, of half a season's growth, to distant purchasers, as "rooted trees," without explanation, is a gross fraud, which has been most extensively practised already, and by which hundreds of thousands of dollars have been, and will be, unrighteously gained. From this description many purchasers of plants will now understand the manner in which their supplies were produced. For plants from layers must necessarily be of small height, the growth late, and a large proportion of the stem unripe—and always without branches, (though sold perhaps at nearly double price for being "*untrimmed*"—) and the roots, consisting of a small horizontal bit of the original stem converted to root, with merely a few thread-like rootlets extending therefrom. Purchasers should guard against receiving the products of layers as "rooted trees," whether sold as "untrimmed" or not.

Cuttings, also, may be separated from young plants in any wet season, during summer, and, if set out immediately, will live, and form separate rooted-plants. We are inclined to believe that the *topping* of young plants, for this object, in July, would be useful, by causing more extension of side-branches, and better maturing the buds on the extremities.

Among the great and unexpected products from this year's growth of mulberry plants, there will be an abundant harvest of law-suits. We know of several having been already commenced; and hundreds of others will follow. There will be many novel points of agricultural law for the courts to decide, which will be curious; and not a little amusing to all except the litigant parties. All persons who make contracts, should be very cautious as to the other party with whom they deal, and the manner of fixing the conditions.

We will close these scraps of information with some arithmetical calculations and estimates, which perhaps may be of service to readers who design either to buy or to sell, or who are in possession of multicaulis plants. We have had reason to be surprised to find, in sundry cases, how little had been done, even by dealers to large amounts of money, in the way of estimating

arithmetically, the present or prospective amounts, or market prices of their possessions or purchases. It is, therefore, that we have thought that these *mulberry statistics*, and estimates, trifling and humble as they are, may not be useless.

On page 592, vol. II, of Farmers' Register, and in the appendix to the 'Essay on Calcareous Manures,' (pp. 103, 104,) there is a table of the number of plants, or rectangular spaces, in an acre, at every distance that can be desired. This will be found far more convenient for reference to show the number of mulberry plants to an acre, than for the other purposes for which the table was originally designed.

According to this table, an acre of land planted with cuttings at the distance of three feet by one, would take 14520 plants. This allows abundant space for the first year's growth. At three feet by eleven and a half inches, there would be 15125 plants; and therefore, for round numbers, 15000 may be taken as the number of cuttings proper for an acre, and which, if not growing unusually large, would not be too thick, even if all were to live. Upon this ground, the cost and returns (and *conjectural* profits) will be estimated.

Cost.

15000 single-bud cuttings, bought November, 1838, at 2½ cents each, make the cost for an acre, - - -	$375
Interest on $375 for a year, - -	22
Keeping cuttings through winter and cultivation in 1839, - - -	25
Rent of land, - - - -	18
Total cost, - -	$440

Profit.

Suppose of 15000 cuttings, 6000 to fail, and only 9000 trees to grow, and these to average only thirty good buds each—and these buds to sell in November, 1839, at but half a cent each; then the product will be,

9000 plants, × 30=270,000 buds × ½ cent, - - - -	$1350
9000 roots, at three cents each, -	270
Gross product, -	$1620
Deduct cost, - -	440
Leaves, upon these data, clear profit, -	$1180

This profit, or even half as much, ought surely to satisfy the most eager; and as every expense is charged full high, and the failures allowed are far too many, for an average season, (and even if such unusual loss should occur, the vacant spaces might be filled by summer layers,) there is nothing wanting to almost insure the full profit, except *this one datum, that buds next fall shall be worth half a cent each.* Of this chance, we leave each one to judge or conjecture for himself. If, as most persons now believe, the price should be much higher than the above-stated, there would be more than a proportional increase of net profit, as no more expense will have to be paid; and if the present enormous prices of the cuttings and roots should be maintained in the next crop, (say 2½ cents the bud, or 15 cents the foot,) then the gross product of the acre would rise to the almost incredible amount of - - $8100

And, deducting expenses, -	440
The net profit would be, -	$7660

Enormous as is this statement of profit, it is believed that it has been actually equalled this season in sundry cases. The most remarkable example, in which it is believed that these profits have been fully equalled, is in the large nursery near Richmond, cultivated by William Kenrick, a nurseryman of Newton, near Boston; though under all the disadvantages of cultivating by agents, and on rented land, so many hundred miles from his residence.

SOME ACCOUNT OF THE INTRODUCTION OF THE MORUS MULTICAULIS INTO THE UNITED STATES, AND THE DIFFUSION OF THE KNOWLEDGE OF ITS PECULIAR VALUE, AS FOOD FOR SILK-WORMS.

In the foregoing article, it was stated, that the profits of cultivating the morus multicaulis, (not meaning the profits of speculation,) have generally fallen to individuals who are the most disposed to read, and to pay respect to the information of, books or other publications on farming; and who are the most ready to try the experiments and new improvements therein proposed, or made known. But, to this general rule there is one remarkable exception, which it is our purpose to present, and in the hope that a proper sense of gratitude and justice will prevent this exception remaining much longer in existence.

To Gideon B. Smith of Baltimore, more than to any and to every other individual in this country, are the country at large, and the fortunate individual cultivators in particular, indebted for the possession and enjoyment of the value of the morus multicaulis. He was one of the earliest possessors—the very earliest, to investigate, and to learn its value, from foreign publications and from his own experiments; and while most other persons were either ignorant or careless of the value, or, when better informed, cultivated the plant solely for self-interest, Mr. Smith was, and has continued to this day, without reward, or any hope of remuneration, the zealous and unwearied advocate for the dissemination and use of this tree. He has gained, in pecuniary reward, no more than he expected—that is, *nothing*; and it would seem, that efforts have been made to take from him even the credit of his voluntary and gratuitous labors, and to assume the merit not

only of superior intelligence in this respect, but of *disinterestedness*, and *public spirit*, of which the claimants have never had the slightest conception.

It is not the *market value* of this article which Mr. Smith has had any agency in establishing or increasing, except so far as this factitious and speculative appreciation is certainly founded on a real intrinsic value. He has had no hand in stimulating the present rage for speculation and, on the contrary, has done what he could to allay it, and prevent the greatest excess of the mania. And he has gained as little by the speculation, and its high prices, as he had by the cultivation. He still owns the oldest tree in the country, from which so many entire and large stocks of trees in the south have been derived; and that is very nearly all that he possesses of the growth. He has sold, or advertised to sell, multicaulis trees; but it was as agent for another, one of whom has made a princely fortune from this source, and who did not even leave to the agent the promised compensation. This circumstance we have heard from another source, and not a hint of it from Mr. Smith. But most of the following particular facts, in relation to the introduction and establishment of the value of the multicaulis, have been obtained from him, in answer to our recent and special inquiries, but without his having been informed, or having any ground to suspect, the object to which we designed to apply the information. Delicacy did not permit any such disclosure; and we fear that he may think that delicacy should also forbid the manner in which it is now made, to himself and the public together. But if so, we hope that the mode may be pardoned in consideration of the object. He knows nothing of this piece, nor of its special or main design; nor will he know, until, by its publication, it must necessarily reach him. It was only as to particulars that it was necessary to direct our inquiries; because we before knew well, in common with most of the readers of agricultural papers, the general fact of the services, in this respect, which Mr. Smith had performed; and suspected that they had been rendered without compensation in any form.

Before proceeding with the statement of facts, we will quote some passages from recent publications, because in some slight degree bearing on the subject of these remarks. In the Richmond Enquirer of October 12th, there appeared a communication (signed J. W.,) on the culture and sales of the morus multicaulis, containing the following paragraphs:

"To the Editor of the Enquirer.

"At your request, I communicate the following views in reference to the introduction, mode of propagation, rise and progress of prices, and the re-production of the 'morus multicaulis' or Chinese mulberry.

"1*st*. *Introduction*.—I believe we are indebted to our worthy fellow-citizen, Dr. Norton, for the introduction and gratuitous dissemination of the morus multicaulis in this country.

"2*d*. *Cultivation*.—The cultivation was commenced in this vicinity by Dr. Norton, about the year 1828; by Mr. John Carter about the year 1830, and by a few other gentlemen in 1832 and 1833."

* * * * * *

"Other gentlemen may have imported into this country the morus multicaulis, and its dissemination may have been enlarged from other sources; but I am of opinion, that from the nurseries in this vicinity, were the supplies principally, if not altogether derived."

The balance of the communication relates to the propagation, sales, and present profits of the trees, and has no bearing on our subject. The Richmond Compiler of the 13th, re-published the entire article, with additional comments, from which the following sentences are copied:

"In our article a few days since, on the subject of silk-culture, we stated, that our vicinity had done its full share towards the introduction into this country, of the morus multicaulis or Chinese mulberry, so useful in the raising and support of silk-worms. We stated that our worthy citizen, Dr. Norton, was among the first, if not the very first, to cultivate it. These opinions of ours are sustained by a letter in the last Enquirer, addressed to its editor, in reply to certain queries connected with the silk-culture. We are glad to find that we were correct; and that to Virginia belongs the credit of having been foremost in a matter, which is to confer a lasting and important benefit upon the nation." * * * * * *

"The cultivation of the morus multicaulis with us is a source of great profit, owing to the better adaptation of our climate and soil to it than any north of us; and we owe Dr. Norton many thanks for having introduced the cultivation of it here." * *

Now, though we have resided for years within no great distance from Dr. Norton, (besides our intimate acquaintance with, and frequent presence in, Richmond,) and though we are anxious at all times to give due credit to benefactors to agriculture, and especially to render all due honor to the improvers of Virginian agriculture, we had never before heard of this claim to the merit of having introduced the culture of the morus multicaulis. It is very true, that neither of these articles is *written* by Dr. Norton, (nor the still earlier one referred to above, which escaped our notice,) and therefore, no matter how incorrect, he cannot be held responsible for their *first appearance*. Neither can the anonymous writer in the Enquirer, nor the editor of the Compiler, be blamed for giving to *him* the credit, which they deemed, on report doubtless made to them, to be his just due. *But this we maintain*—that no contradiction, or explanation, or waiving of the undeserved honor, having been published by Dr. N., even to this day, he has, indirectly, but most fully, sanctioned the claims made for him in both these publications.

In our letter of inquiry to Mr. Smith, we directed his attention to these publications. The tone of his answer is, naturally enough, somewhat *tempered*, by the very unexpected discovery of a new competitor for the only reward which he thought he had earned—the honor of bringing the multicaulis into notice and extensive use, and *possibly*, also, some feeling of gratitude from the individuals who are growing rich from having known better than himself how to profit by its pecuniary and trading value. Under such circumstances, his tone may well be excused.

The answer of Mr. Smith, (dated October 16th,) says—

"The history of the introduction of the morus multicaulis is as follows. When Congress passed the resolution instructing the Secretary of the Treasury

to collect information on the subject of silk culture, Wm. Prince & Sons, of New York, wrote immediately to Marseilles, in France, to their agent, ordering all the books on the subject, and specimens of all the mulberry trees known there in use for silk, to be sent them. This was in the year 1826, and the plants arrived January 7th, 1827. Among the trees received, one variety was called the *Philippine Island mulberry*. Messrs. Prince immediately sent me one tree of each of the kinds they received, amounting, I believe, to 15 kinds. The Philippine Island mulberry, proved to be the tree subsequently named the morus multicaulis. A year or two after I received these trees from Prince, the French papers published notices of the valuable qualities of the morus multicaulis, a tree just introduced by the enterprising Perottet, describing its characters minutely. On reading those descriptions, I immediately discovered that our Philippine Island mulberry was described as the multicaulis, and wrote to Mr. Prince to that effect, and at the same time informing him that I had used it for feeding silk-worms, and found it to be every thing the French writers had described it to be. Prince concurred with me, and propagated the tree for sale, and has done so every year since, besides importing from France more trees each year than ever were produced in Virginia altogether, until the present year. Dr. Pascalis, of N. York, in the spring of 1830, received three trees from France, one of which he gave to my old friend Parmentier, then of Long Island, one to Dr. Hosack of New York, and one to some one unknown to me. The above is a circumstantial and true account of the introduction of this tree into this country, and of the discovery of its valuable properties. Messrs. Prince's old tree occupied a place in their nursery till the fall of 1837, as an old stool for layers; my old tree yet remains in my garden, where it will continue while I live, as it is the oldest, and was one of the first trees in America. So soon as I discovered the valuable qualities of the tree, I commenced propagating it and distributing to every one whom I could persuade to take it. I gave it to every nurseryman in Baltimore; sent it to the south and west, and indeed every where, where I could induce people to take it. I can say freely, that were I paid down for all I then gave away, at the present prices, I should have money in my purse, instead of being, as I am, out of pocket no small sum, on account of my efforts to introduce it into the country at large. I never kept any memorandum of the trees I gave away, nor of the persons to whom I gave them; but I can adduce the testimony of every nurseryman in Baltimore, (and of the country at large, I might say,) to prove, that the celebrity of the tree is due to me, and that, for six or seven years, I was *alone* in the effort to introduce it. I gave trees to Mr. Samuel Feast, Mr. John Feast, Mr. Robert Sinclair, Mr. James Wilkes, Mr. Bastien, and numerous others, all regular nurserymen, in 1829, or 1830, with urgent recommendations to propagate them extensively, "for the time will come when you will make your fortune by them"—my invariable remark to all. I was laughed at by all; and, from all quarters, was called "the mulberry madman," "the silk-worm maniac," and all that sort of thing, for my pains; but still I persevered until I waked up the sleeping lion effectually." * * * * * * * *

Mr. Smith, as editor of the American Farmer for several years, and, indeed, for several years before, (as far back as 1826,) had been urging the value of silk-culture, and the propriety of propagating the mulberry. His editorial influence, (which, for this purpose, was used before he was ostensibly an editor of an agricultural journal,) gave him the greatest facilities for disseminating his opinions on the general subject; and as soon as he had learned the value of the multicaulis, all his zeal was enlisted in aid of spreading the plant itself, and a knowledge of its value, throughout the United States, and even beyond the limits of this country. Another passage of his letter says,

"When I had satisfied myself of its qualities, I began to publish my opinions, and they will be found in the American Farmer, from 1831 to 1834 inclusive, as well as in almost every other agricultural journal in the country. My public writings, however, did not comprise one hundredth part of my labors in the cause. It was by private correspondence I did the great amount. I was incessantly plied with letters from all parts of the union, making inquiries in relation to the best kinds of mulberry trees for silk-worms; and in answer to them all, I invariably recommended the morus multicaulis, *when there was not another man in the country*, except Mr. Prince, Dr. Pascalis, (who merely adopted the opinions of his friends in France, having no experience of his own,) and Mr. Parmentier of New York, who agreed with me. From the summer of 1830, to the present time, I must have written some thousands of such letters. Great numbers of these answers have been published in the local newspapers, where they were received, and of course multiplied greatly the number of inquirers. I have often had five to ten letters a day, from that time to this, to answer on this subject—for, be it known, the present mania has not lessened, but, on the contrary, materially increased my correspondence on this subject. The great burden of my labors has therefore been unseen by the public; but still, the public has seen enough in the public prints, besides all this, to award to me the credit of being *the* promoter of the culture of morus multicaulis in this country. So universal is the opinion that this credit belongs to me, that strangers, whom I never saw nor heard of before, have frequently called on me to inspect the leaves of my trees, fearing they had not obtained the right kind, and supposing that I was the original importer of the tree. Many persons have come to me from a distance, to get trees from me, to be certain of getting the genuine ones, when they could have got them at their own doors for far less expense. I have sent the trees to South America, to Cuba, Jamaica, and to several places on the Mississippi river, all gratuitously; for having been applied to for information on the subject of silk, and the best kind of trees, from those places, my recommendation of the multicaulis was always accompanied, when a conveyance offered and the season admitted, with at least one tree, or cuttings.

"Another point. The facility of cultivating, and particularly of propagating the tree, was discovered by me. When I received my first tree, an accident befel it that was nearly fatal. It was growing in my garden with 15 other kinds, and I was feeding silk-worms with every spare leaf I could get from it. In 1829, I believe, about the first of July, I discovered one morning, that the leaves were all turning yellow. Knowing its value, I was considerably frightened, and immediately wrote to Messrs. Prince to send me another tree, as mine was dead. Late in the season as it was, they did send me one, that was growing in a flower pot with an oleander; I presume they had put a small cutting there accidentally. But, as soon as I had written to them, I went to the garden and examined the tree carefully, and found that a nest of ants had surrounded the tree and perforated the trunk at the ground, through and through, and that it was dead 5 or 6 inches from the ground, but that the whole top was yet sound. I took a spade and dug a trench south of the tree, intending to layer it; in the hope that I might make it take root again, and thus save it. On bending it down, it broke short off near the ground. On this occurrence, my wife and other persons looking on, observed that I "*turned as pale as a sheet;*" I mention this to show how much I then thought of it. I, however, covered up the tree, turning up the end of each branch just above the earth, watered it well, and never looked

at it again for two or three weeks—I never can bear to look at my misfortunes, it hurts my feelings—and then I was led to it by accident. When I did visit the spot, I was astonished to find the ends of all the branches I had turned up had made considerable growth. That fall I had 8 young trees, larger than the original plant. That gave me my first idea of the facility with which it can be propagated. I afterwards adopted the single-bud system of propagating, with which you are well acquainted, and practised it for two years before the public knew any thing about it. I did not publish this mode of propagation for several years, thinking to make something out of it for myself, but communicated freely *privately* to others, and before I knew what I was about, they had got all the advantage of it, and one of them even claimed the credit of its discovery in the public papers, just as another person now claims credit even for introducing the multicaulis into this country!

"In conclusion—it is to *Wm. Prince & Sons*, of Flushing, N. Y., that the credit is due of first introducing this valuable plant to the country; to whom the credit is due for discovering its valuable qualities, the great facility with which it may be propagated, and bringing it into general notice, indeed making it what it now is, I leave you to judge.

"I must now apologize for this long answer to your inquiries, filled as it is with selfishness and egotism. On reflecting on what I have written, I feel asnamed of my answer. Why should I attribute any importance to the thing? Do I not know that there never was a pioneer in any thing that got any thing but his labor for his pains? Look at Whitney with his cotton gin, Fulton with his steamboat, and all others of the same genus. I must therefore be content to have labored for the public, and let others receive the credit of it, as well as the pecuniary consideration.

* * * * * *

"One more explanation. I have intimated that I have never made any thing by morus multicaulis. I mean to be understood as saying, that I have never made as much as it has cost me. I am a loser by it. I do not wish to be understood as never having sold trees. I have sold a few every year for four or five years past. The largest lot I ever sold of my own raising, was 150, and the largest number in any one year of my own was 150. I have also made, as agent for others, $400 to $500 altogether, in commissions on sales."

And now to recapitulate, and to conclude.

To the intelligence, zeal, and untiring efforts of Gideon B. Smith, the people of the United States are mainly indebted for now possessing, and knowing the intrinsic value of, the morus multicaulis; and for the greatly increased facilities which its possession offers for making this a silk-producing country. If rewards were given in this country by government, (state or federal,) for distinguished services rendered to agriculture, then might a strong claim to honor and reward for this individual be made on the gratitude of his country, to be responded to by its government. But such not being our system, he, like the greater and more distinguished national benefactors whom he mentions, as well as all other pioneers in agricultural and mechanical improvement, must alike go without national rewards. But, in this case, there is another rich source, and which ought to be as liberal as it is rich, from which something may be hoped to be drawn. In the present strange condition of things, every cultivator or owner of a multicaulis nursery has suddenly found himself made richer by some thousands of dollars. Many persons, within a few months, have thus gained their thousands—some few their hundreds of thousands. If all, or if even the more liberal half of the many individuals thus benefited, would contribute to a joint fund only *one dollar in each hundred of their clear gain* so made, by the increased market value of their multicaulis plants, it would constitute a reward for the man who has been the chief agent in producing their good fortune, both large in amount as a pecuniary compensation, and still more precious as an honorary distinction. Let all such persons, then, who approve the plan, unite with us in making up such a fund. We offer to receive, and to be accountable for contributions in payment for any such debts of gratitude, and to dispose of the amount, under the direction of a committee of the principal and most accessible contributors, in such manner as may be supposod will render the reward most acceptable to the receiver, and most useful to the public. We have already proposed this plan, verbally, to several of the fortunate persons concerned; and all have approved the object, and most of them will aid in carrying through the plan. We invite all the fortunate possessors of multicaulis, and speculators in sales, to contribute to the fund, and to place their names, and the amounts subscribed, as speedily as convenient, at our disposal. To commence the list, we will subscribe $100; and whatever may be the degree of success, the plan will be executed to the extent of the subscriptions which may be offered and paid.

In advance of a more general publication, a copy of this appeal will be sent to every known and large recent possessor of multicaulis plants. From many of them, and of the far greater number unknown, whom it may reach accidentally hereafter, early and generous responses are hoped to be received. The names of the subscribers, and the amount of their subscriptions, will be announced in each successive publication of the Farmers' Register; and a suitable disposition of, and accounting for, the whole amount subscribed and paid in, will be made, as soon as may be directed by the committee chosen for that purpose, in the manner stated above.

The most appropriate disposition of such a fund, in our opinion, would be the following: Let a snug and productive little farm be bought, some acres of it planted with multicaulis cuttings, and a good cocoonery erected, as well as the other fixtures necessary for a silk farm; and when all the essential arrangements are made, let the farm, (for which "Gratitude" would be a suitable name—) be given to Gideon B. Smith. If, when thus provided with the means, it should suit his wishes and convenience to devote his labor and time to silk-culture for his own benefit, with even half the zeal and perseverance with which he has long been laboring to introduce and establish it for the public interest, he will be still farther, and greatly, serving the public weal, by furnishing example, and practical instruction, in this new branch of industry, to the region in which the farm will be situated.

ED. FAR. REG.

From the Genesee Farmer.

IMPROVEMENT IN THE MANUFACTURE OF FLAX.

The August number of the Journal of the American Institute—a work we most cordially recommend to the patronage of our readers—contains a letter from J. F. Schermerhorn to the commissioner of patents at Washington, describing a new mode of manufacturing flax, or rather so preparing it for manufacture that it can be spun on the common spinning jenny as easy as cotton, and converted into cloth with the greatest facility. Mr. S. Olcott of New Hope, Pa., is the inventor of the process, and should further tests and trials but realise a small part of the benefits indicated, it will prove a discovery of immense value to the north and west. The flax, as we understand the letter, is by a short and simple process, and with the aid of machinery, converted into what Mr. Olcott calls his short staple flax; is deprived of its gluten and coloring matter, and bleached, and is then ready for spinning.

Specimens of the thread made from the prepared flax, as well as samples of the flax itself, were left at the office of the Institute, and attracted much notice from their beauty and strength. The only objections started, were that by being made into short staple, the thread lost the smooth silk-like appearance belonging to the unbroken fibre, and appeared more as if made of bleached tow, or rather of floss silk. When we reflect, however, on the smooth thread made from cotton, a material still shorter in fibre, and far inferior in strength, there can be no reasonable doubt that in the process of manufacturing linen cloth from prepared flax, methods of obviating this and other difficulties will be easily found. In the language of the Journal, this improvement, "must produce a wonderful advance of productive industry in our portion of the union. In the west it will open mines of wealth. If flax can be produced and prepared for the spinning jenny as cheap as cotton, and converted into cloth as readily, then the northern and middle states can avail themselves of a great staple that will vie with the south; and this may be done at once, for we already know how to spin. It is not like silk, which is sure to succeed eventually, but progressively. The mulberries must have time to grow; and the knowledge requisite for managing the silk-worms, taking care of the cocoons, reeling, &c. will require time to be generally adopted and understood."

Mr. Schermerhorn makes some interesting estimates of the profits that must ensue from the production and manufacture of flax. We have room for only the following:

"1. Estimate for buildings and machinery to manufacture 1000 tons of short staple flax, $30,000
The actual expense of preparing 1,000 tons of fine flax; including the raw material, at $250 a ton, - - 250,000

$280,000

Now if we estimate this short staple flax worth fifty cents per pound, which will not be deemed an extravagant price when it is remembered that every pound of such fine flax will make between four and five yards of fine linen, say four yards, and this can be made into fine linen at about four cents per yard: then 1,000 tons being 2,000,000 pounds will be worth at 50 cts. per lb. - $1,000,000
Now deduct from this as above for buildings, machinery, raw material, and expense of manufacturing the fine flax, at 250 dollars a ton, - 280,000

Which leaves a profit after paying for buildings, and washing, &c., &c., - - $720,000

2. Estimate for manufacturing the fine short staple flax into fine linen. * * To manufacture 2,000,000 pounds, which will make 8,000,000 yards of linen, you must have in operation about 850 looms, at an expense of one thousand dollars each, - - - - - - - $850,000
Spinning 2,000,000 lbs. at 8 cts. per lb. 160,000
Weaving and putting up 8,000,000 yards, at 2 cents per yard, - - - 160,000
2,000,000 lbs. of fine staple flax at 50 cents per lb. - - - - - 1,000,000

$2,170,000

If we estimate this fine linen at fifty cents per yard, then the value of 8,000,000 yards will be - - - - - - $4,000,000
From which deduct as before, for buildings, machinery, stock and labor 2,170,000,

and a net profit is left of $1,830,000

Mr. Olcott, at his flax establishment at New Hope, works up at present, about three thousand tons of flax in the stem per year. This produces about 430 tons of fine short staple flax, ready for manufacture; from which it seems that it takes about 7 tons of stem to produce one ton of short staple flax. From Mr. S.'s letter we gather, that the lands in Penn. and N. Jersey, in the vicinity of New Hope, as an average crop, yield one ton of stem to the acre, for which Mr. Olcott pays at his factory twelve dollars a ton; and it is fair to conclude that the average yield of flax seed will be worth at least as much more from an acre, which will give the farmer 24 dollars per acre, as the avails of his flax crop, and this must be considered a good business. It is in the rich and beautiful prairies of the west, however, that we think the manufacture of flax will be carried to the greatest extent, and most profit. Should the flax noticed in our sketch of Mr. Parker's travels, as growing wild in the valleys beyond the Rocky Mountains, and being perennial like our grasses, be introduced into the western states, and succeed as we trust it may, it can then be mown like grass, and gathered year after year without a second sowing; and even the common flax cannot fail to yield a rich harvest to the industry of the fertile west.

From the Huntington Gazette.

RATS IN GRAIN.

How to prevent the ravages of rats in grain after it is housed, has been an inquiry of long standing. We can never exterminate them to such a degree as not to apprehend their incursions, for a horde of these troublesome visiters will often make their appearance when we least expect them. Instinct points the way where that provision best suited to their nature is found most plentiful. We have

often found, when we went to thrash, our oats cut and cleaned by them, and the straw rendered unfit for any purpose whatever, except the subservient one of litter.

But every evil has a cure: and I have found "common elder" to be a common preventive,and have tested its properties as an anti-rat application. When the grain is to be packed away, I scatter a few of the young branches over every layer of bundles, being mindful to have them in greatest abundance on the edges of the pile. The drying of the twigs will give the grain an odor not relished by the vermin—which scent in no wise detracts from the quality of the straw for horses, as it makes no sort of difference with them. I have tried it successfully, a number of years, in wheat, oats and corn.

For the Farmers' Register.

GENUINE MORUS MULTICAULIS. NOT EXEMPT FROM THE DEPREDATIONS OF INSECTS.

"*October* 18*th*, 1838.

As Mr. Gideon B. Smith seems to be considered, by yourself and others, the best authority in regard to the multicaulis mulberry, there are two assertions in his communication in your last Register, which induce me to fear that I, who am one of the humbugged class, may have been buying the wrong sort. Mr. Smith says, "the leaves, when full grown on the vigorous wood, are 12 to 15 inches in length, and 10 to 13 wide." Now, after inspecting many hundred bushes of the kind I have purchased, which had all the appearance of vigorous growth, I have seen no leaf much, if any more than half that size. It is true, I did not apply my rule, but my eyes could not so far deceive me.

Again—Mr. Smith asserts, as "a remarkable fact, that all the species and varieties of mulberry tree are exempt from the depredations of all insects, except the silk-worm." He farther states, that, "during ten years that he had been a close and daily observer of the morus multicaulis particularly, he never saw an insect of any kind upon it." Since I know, from many years' observation, that he is mistaken in what he assumes to be a fact—at least so far as our native varieties, and the English mulberry, cultivated in our gardens, are concerned—I hope he is so in regard to the multicaulis, also. If he is not, then have I an additional reason to fear, that my purchase is not of the genuine kind: for, the few plants saved of a small trial made last spring, have their stems and many of their leaves now nearly covered with numerous small, greenish-colored bugs, that seem quite as much at home as if they were in their native domicil. We have been dosing them with soap-suds to kill or drive them off: but have not yet ascertained how the physic will work. It is probable, however, that it will be effectual; for these little depredators appear to be the same species which often infest our rose-bushes, and which are easily destroyed or driven away, either by soap-suds, or soot and water. This last mixture, by the way, is an excellent thing, if not made too strong, for accelerating the growth of all garden-vegetables, especially where the ground has not been fully manured. I remain,

Your friend and constant reader, J. M. G."

An editorial note, attached to the passage referred to above, stated another exception to the general rule which Mr. Smith had given as the result of his experience. That note drew from him the following passage of one of his private letters:

"I am much surprised at your note, [page 421, No. 7,] relative to the caterpillars devouring the multicaulis, and thank you for it. It is the first instance I ever heard of, and I fear it is the forerunner of a terrible calamity to the cause of the silk-culture in this country. I never heard of these insects touching any species of mulberry before; and as they never quit any kind of trees after they once begin upon them, I much fear they will extend their depredations to the mulberry generally; and if they do, it will be a sad drawback upon the business. But five years ago, our elms, [in Baltimore,] that had stood untouched by any insect for ages, were first observed to be infected by a small caterpillar; the insects increased every year, until in the last two years, our once stately and, as ornamental trees, entirely unequalled elms, have been entirely stripped of foliage, as though a deadly blast of fire had passed through them. Last year, the beautiful lindens were first visited by the same insect, and now we expect them also to share the fate of the elms."

We presume, that our friend, J. M. G., need not distrust the *genuine* character of his plants, merely because of the smaller size of the leaves. The sizes spoken of by Mr. Smith, were the largest, and not meant as usually found, on any but very luxuriant growth. No one who has once noticed the multicaulis, can mistake it for any other kind of mulberry tree; and, therefore, the person who furnished to our correspondent his original stock, could not have given a wrong kind, unless wilfully, and by designed deception.—Ed. Far. Reg.

INQUIRIES IN REGARD TO KEEPING SWEET POTATOES.

To the Editor of the Farmers' Register.

Can you inform us through your November No. how to preserve sweet potatoes through the winter? Should they be gathered before a single frost, or after one has fallen to kill the vines? I am inclined to think that the error is in suffering them to remain in the earth until a frost; and hence the difficulty of keeping them has arisen with us. Some of your correspondents in the lower districts, could inform you, as I have often seen large supplies from them in the spring, in a very perfect state. C. H. M.

SOAKING SEED CORN IN SALTPETRE WATER.

To the Editor of the Farmers' Register.

I am utterly astonished at the *simple fact*—"truly *simple*, in one sense of the word," stated in your last No. by Mr. Massey, of New York, as "one of the greatest discoveries of modern

times" that corn soaked in a solution of saltpetre, and planted under equal circumstances, with this exception alone, produced 500 per cent. more than corn not so prepared.

A few years ago, for protection against the worm alone, I used this solution on my seed corn—alternating throughout, a large space of the field with, and without it, every twelve rows. The second year I also tried it for the same purpose, and *for no other*—the result was, in both, absolute futility in all respects. J. E. MUSE.

Dorchester, Md.

[Our comments on this remarkable "*fact*," were given at p. 434 of the succeeding number, to which the reader is referred.—ED. FAR. REG.]

From the Maine Farmer.

PIG TROUGH.

A writer in the Genesee Farmer, a few years ago, described a method of making this article, which we copied into the Maine Farmer, and which we have also practised, and find to be a great improvement.

It is simply this. Take two pieces of board or plank of the length that you wish your trough; put two of their edges together at right angles, thus V, and nail them strong. Then take two pieces something longer than the trough is wide and nail upon the ends. Then take some clay mortar and fill up the chinks to prevent its leaking, and it is done. The food settles down in the angle at the bottom of the trough, and the pig will *fay* his sharp under jaw into it completely, while the long ends prevent its being upset so easily as the old kind. Any body who can saw a board off, and drive a nail, can make one. If you have no trough for your pig, just try your hand at making one on this plan.

From the Cultivator.

SUBSTITUTE FOR SPAYING. ANOTHER WITNESS.

Ivanhoe, Campbell Co. Aug. 18, 1838.

Dear Sir—I have been for some time an attentive reader of your valuable paper; from each page information is to be gained. In your last number, you instruct us how to perform the operation of caponing cocks, before which I knew not. And it is the above which prompts me to give you the following information:

The old method of gelding sows is not only very cruel, but quite disagreeable to the operator, as well as dangerous to fat animals. Now, sir, the modus operandi in this neighborhood as practised by myself lately, but much longer by others, is simply this: For convenience use a common goose quill as a tube, cutting off smoothly the small end, the other shaped as for a tooth-pick, to be used as a handle; then pass the small end down the vagina two inches or more, (according to the size of the animal,) through which drop six or seven shot, say No. 3, and your work is complete. Nothing can be more simple, innocent, or efficacious.

Should you think the above worth making known, you can publish it.

Very respectfully, your ob't. serv't.

EDWARD B. WITHERS.

From the Tennessee Farmer.

LOIN DISTEMPER IN HOGS.

By this I mean the loss of the strength of the hinder parts. One of my best hogs was found the other day unable to walk, from falling behind; and as I never saved one thus diseased, I gave him up for lost. I, however, separated him from the herd, and concluded I would nurse him until he might die, as is my practice—being opposed to killing any of my animals that may chance to sicken or get wounded.

Now, as the treatment, or something else, has relieved him, I annex it. I poured warm tar upon his loin; when this dried, I repeated it—pulling out the hair adjacent. Simultaneously with this, I mixed one tea-spoonful of arsenic in corn meal dough, which he ate freely. He is now on his feet and doing well. Whether my hog recovered in consequence of the treatment, or in spite of it, I cannot tell; but one thing I know—all that had it before died, and this one lives. I do not wish to get the people to poisoning their hogs with arsenic; but as it is a gone case any how, those who may venture upon the practice, I hope may have the same good luck.

PARVUS AGRICOLA.

July 28, 1838.

From the Farmville Journal.

THE MORUS MULTICAULIS.

As many persons in your vicinity are interested in the culture of the mulberry I send you a few remarks upon an article in the last Farmers' Register. Mr. Ruffin there advises farmers who have any idea of going into the raising of silk "not to buy them (the Chinese mulberry) or at least very few of them at the exorbitant prices, which the always easily gulled public have heretofore paid, and which are now threatened to be advanced." In a subsequent editorial, advising present holders not to sell, he says, "and therefore at half a cent or even a quarter cent the bud, the stock of 1839 will yield a much greater sum, than the present growing stock at two cents the bud or 25 or 30 cents the rooted plant." We will not dwell on the slight inconsistency of advising purchasers not buy and sellers not to sell, as our object is simply to examine the question whether it is for the interest of those who are intending to engage in the silk business to purchase the morus multicaulis now at present prices, or to purchase two years hence at greatly reduced prices. Mr. Ruffin says, that buds are regularly and readily sold at two dollars per hundred, and that he is preparing to come into the market with trees and cuttings as soon as he can furnish them at one-fourth the present price. We infer, therefore, that he considers one-fourth the present price, or half a cent a bud, a fair price, or the probable price a year or two to come, when the mania has sub-

sided. But to put our calculations out of the reach of cavil, we will suppose the price of multicaulis buds two years hence to be one-eighth of a cent each, only one-sixteenth of the present price, and we think we can demonstrate from Mr. Ruffin's own data, that a person who intends engaging in the business, had better give 100 cents a bud *now* than one-eighth of a cent for a bud two years hence. We take Mr. Ruffin's own data. "Every single bud planted next spring and well taken care of, will produce from 10 to 70 buds, say not less than 30 on an average." One bud then set out in the spring of 1839 will produce 30 in the fall, which set out again in the spring of 1840 will produce in the fall 900 buds, and the original bud will produce the second year 100 buds, making in the fall of 1840 1000 buds, besides 31 roots. The roots will be a fair compensation for labor, rent of land and interest. The 1000 buds at one-eighth of a cent would be one dollar and twenty-five cents. That is, a bud for which 2 cents is now thought an exorbitant price, will in two years produce buds worth $1,25 at one-eighth of a cent each. It will be seen then that an individual, who intends engaging in the business at all may as well give $1,25 *now* for a bud as one-eighth of a cent for a bud two years hence, according to Mr. Ruffin's data. We think, however, his calculations are rather too high for ordinary country cultivation. Twenty buds for one will be found nearer the truth in most cases, though we have no doubt with great care, 30 may be realized. One bud would then produce 20 the first fall, the 20 would produce 400 the second fall. Add 100 buds for the produce of the first bud the second year, and we should have 500 buds the second fall. At one-eighth of a cent, 500 buds would bring 65½ cents. The roots paying for cultivation, &c. According to this, a person had better give 50 cents now for a single cutting than one-eighth of a cent in 1840—besides the pleasure of a comfortable hobby to ride for two seasons. We offer these calculations for the benefit of those who have trees to sell as well as those who wish to buy, and have shown, we think, that if cuttings are worth one-eighth of a cent in the fall of 1840, present owners had better keep their cuttings than to sell them for 10, 20, 30, or even 50 cents a bud, to say nothing of 2 cents, and that purchasers would, of course, do better to buy now at 20 times the present exorbitant price, than at one-eighth of a cent in the fall of 1840.

MULTICAULIS.

[We are always willing to receive correction, and submit to censure properly applied, whenever our editorial errors require either; and the republication of the foregoing piece, from another print, is evidence that we do not, in this case, wish to conceal the censure, or keep out of sight the alleged inconsistency, by which it has been elicited. But we do not admit the inconsistency charged; nor would our censor have made the charge, if he had more carefully read, and correctly quoted our expressions. The advice in the first piece, "not to buy at the then exorbitant prices," was limited in its bearing to the purchasing of *plants in large quantities*. It was not meant for speculators, but for farmers who desired to commence the silk business; and the advice was founded upon estimates then submitted, and very similar to those made (and very correctly made,) by our censor, and both of which show clearly, that a very few plants bought now, would, in a few years, suffice to furnish an abundant stock of trees. The question, then, for those having no view to the selling of trees, was this: "Is it better to buy 2000 trees now, or only 50 or 100, and be but a year later, in obtaining a stock equally large?" If most buyers had decided upon the latter course, it would have moderated the violence of the speculating fever; and if purchasers generally were to choose the former and quicker course, it is manifest that the bubble of speculation would be distended to a hundred-fold its then, or even its present magnitude, and that market prices would be as much advanced above the intrinsic value of the plants—great as that intrinsic value certainly is. Our remarks then, and our course since, were designed and calculated to repress the enormous excess, the madness of speculation, as much as to urge proper attention to mulberry and silk-culture. As we first advised intended culturists not to buy *many* at exorbitant prices, so six weeks after, (for that time elapsed between the printing of the two pieces, as was stated and explained,) when the prices were still more exorbitant, we advised the cultivators "not to sell any *to speculators*, lower than at the highest [existing] prices." This is very different from advising simply those who wanted, "not to buy," and those who held, "not to sell," alone and without limitation, with which inconsistency we are charged above. The fact was, that northern speculators had been sending all over Virginia, and, before the holders were aware of the great advance of prices, had bought up many nurseries at less even than the intrinsic value, and at less than a sixth of what they would now sell for. One individual, as we are informed, has in this way made $150,000, within the last few months. Our warning, though late, was in time to save thousands of dollars to some of the cultivators.

But though we deny the inconsistency charged above, we are far from denying great changes of opinion on this subject, within less time than elapsed between the writing of these two pieces. Indeed, if any man has thought precisely alike, made similar calculations of profit and loss, and would have pursued the same course, at any two periods six weeks apart, during the time of the rapid growth of this mulberry mania, we readily admit that he has far more wisdom, and especially more foresight, than we can boast of possessing. No man could have foreseen the extent and rapid growth of this mania, nor can we pretend to do so at this later time.

Our former intimation that we were preparing to come into the mulberry market when we could contract at one-fourth of current prices, was not meant otherwise than to express the certainty of the then high prices being short-lived. We certainly did not mean to propose that any person should wait to obtain his stock from us, on such terms. But the intimation, then given in joke, we are very ready to execute in earnest, by now contracting to deliver plants next autumn, at one-fourth of the prices current at the time

of making the contract. Nor is this offer made at any risk; for where the crop is as sure, and the growth and increase as great, as in lower Virginia, any one may safely buy stock at the highest prices yet heard of, if he can sell the product, on previous contract, at one-fourth of that price.—Ed. Far. Reg.

WELL SPRINGS.

To the Editor of the American Farmer.

Newbury, S. C., July 5, 1824.

Sir—Permit me to communicate to you a new method of digging wells, which in a hilly country makes them, in my opinion, superior to springs.

The method occurred to me some years ago, and I have often spoken of it as practicable, but I never heard of its being reduced to practice until lately. Mr. John Rhoden, of Chester, I am informed has in the course of the last year made the attempt, and completely succeeded.

Mr. Rhoden had a well on the side of a steep hill, the cleaning and repairing of which had cost him much trouble and expense, to little purpose. At length it occurred to him that if he could make a horizontal opening into it from the side of the hill, on a level with the vein, that he might thus be enabled to procure a running stream from the well, such as is found at springs, and gain an easy access to it, for the purpose of cleaning it out whenever it might become necessary. When the work was set about, it was accomplished in a few days, and he has now, out of his well, an excellent spring; easy to be cleaned out, with a very convenient milk-house.

The plan which had previously suggested itself to me, and which I still think is even superior to Mr. Rhoden's, is this—select a steep hill, (whose declivity should be, if possible, 45 degrees,) and dig down, opening out as you go in the form of a ditch, from the inner wall of the well, to the side of the hill, and wheeling off the dirt in a barrow, until you come to the vein. Or make, in the first place, a horizontal opening, such as Mr. Rhoden did, into the vein, instead of digging perpendicularly as is usual.

The first method proposed may at first view appear to involve a great deal of labor; but I am certain that on a hill declining at the rate of 45, or even 50 or 60 degrees, a well can be sooner dug, with less labor, with greater facilities for blowing rock, greater security against damp, and more certainty of finding a vein than a common well.

It can be sooner dug and with less labour, for in the first place the dirt to be removed is but about three times as great, as will be procured by only making a diagram of the hill; and in the second place, instead of having to haul up the dirt by a windlass, at the great risk of the well digger, and with much labor and loss of time, it can be wheeled off along the level of the ditch, by a common hand as fast as it is dug.

As to this method affording greater facilities for blowing rocks and greater security against noxious damps, than the common method; this is so apparent as to require no proof.

It is attended with a greater certainty of finding water, because in the common method unless a vein is found within the diameter of your well, you may continue to dig without success, although numerous veins may be running within a small distance of you. But in the method I propose you will have a chance for every vein which runs from the outside of the hill to the inside of the well, for your ditch must traverse the whole of them.

I believe the second method I have proposed has nearly as many advantages as the first, and some others; but these must suggest themselves at the first view, and require no elucidation.

An excellent milk-house may be easily made in the excavation, under either method.

I will not dilate upon the advantages of this method of digging wells. Allow me only to reiterate the superior facilities it affords for keeping them in order.

Many tracts of land, whereon there are no springs, lose half their value; because few would be willing to settle them, and undergo the trouble and inconvenience of watering their whole stock from a well. But my method (or rather Mr. Rhoden's) would afford a running stream from the well for that purpose.

Yours, most respectfully,

Job Johnston.

From the Penny Magazine.

CHANGE OF THE WATER LEVEL IN THE BALTIC.

In Mr. Greenough's address to the Geological Society, as reported in the 'Philosophical Magazine,' it is stated that, as early as the time of Swedenberg, who wrote in 1715, it was observed that the level of the Baltic and German Ocean was on the decline. About the middle of the last century an animated and long-continued discussion took place in Sweden, first as to the cause of this phenomenon, and then as to its reality. Hellant of Tornea, who had been assured of the fact by his father, an old boatman, and who afterwards witnessed it himself, bequeathed all he had to the Academy of Sciences, on condition that they should proceed with the investigation; the sum was small, but the bequest answered the purpose. Some of the members of the Academy made marks on exposed cliffs and in sheltered bays, recording the day on which the marks were made, and their then height above the water. The Baltic affords great facility to those who conduct such experiments, as there is no tide, nor any other circumstance to affect its level, except unequal pressure of the atmosphere on its surface and on that of the ocean; this produces a variation, which is curiously exemplified at the Lake Malar, near Stockholm. As the barometer rises or falls, the Baltic will flow into the lake or the lake into the Baltic. The variation resulting from the inequality of atmospheric pressure, however, is trifling. In sheltered spots mosses and lichens grow down to the water's edge, and thus form a natural register of its level. Upon this line of vegetation marks were fixed, which now stand in many places two feet above the level of the water. In the years 1820–21, Bruncrona visited the old marks, measured the height of each above the line of vegetation, fixed new marks, and made a report to the Academy. With this report has been published an Appendix by Halestrom, con-

taining an account of measurements made by himself and others along the coast of Bothnia. From these documents it would appear—1st, that along the whole coast of the Baltic the water is lower in respect to the land than it used to be; 2dly, that the amount of variation is not uniform. Hence it follows, that either the sea and land have both undergone a change of level, or the land only; a change of level in the sea only will not explain the phenomenon. A quarter of a century has now elapsed since Mr. Von Buch declared his conviction that the surface of Sweden was slowly rising all the way from Frederickshall to Abo, and added, that the rise might probably extend into Russia. Of the truth of that doctrine, the presumption is so strong, as to demand that similar experiments and observations should be instituted and continued for a series of years in other countries, with a view to determine whether any change of level is slowly taking place in those also. The British Association for the Advancement of Science has already obeyed the call. A committee has been appointed to procure satisfactory data to determine the question as far as relates to the coasts of Great Britain and Ireland; and it is to be hoped that similar investigations will also be set on foot along the coasts of France and Italy, and eventually be extended to many of our colonial possessions.

From the Southern Agriculturist.

CAUSE, AND PREVENTION OF FEVERS.

September 28th, 1838.

Mr. Editor.--The many and various observations made upon the change of climate, increase of sickness, and the annual abandonment of our plantations, you are no doubt as familiar with as I am. Time was, when people could remain on, and enjoy their estates all the year round, and with proper management, I think we may in a few years do it again. A writer in your journal, (I believe it was) some time ago, ascribed the comparative frequency of freshets to clearing of the land, and justly in my opinion—but he overlooked a more important consequence, the effect upon the health of the country. I am of opinion, a little reflection will show the change of climate is identical, and has kept pace with, that in the surface of the earth. While in possession of the aborigines, our whole country was comparatively pure and healthy, and Dr. Rush states, that so late as 1782, "some country people of Bedford county, Pennsylvania, travelled twenty miles to see whether it were possible for a German girl, who labored under an intermittent, to be hot and cold at the same time." In former times, fevers were confined to the banks of rivers, creeks and ponds, but the clearings have opened just so many passages for swamp or marsh effluvia, and we find fevers prevailing in the interior, where they were formerly unknown. This will always be the consequence of clearing, without cultivating the ground. While opening the country makes it sickly, as I have already mentioned, *cultivation*, that is, draining swamps, destroying weeds, burning brush, and exhaling the superfluous moisture of the earth, by growing frequent crops of grain, and vegetables of all kinds, renders it healthy. There are other causes of sickness, which never can be entirely overcome, because man has no control over the seasons; the healthiness or unhealthines of a country, depending much on the cold or heat, the dryness or wetness of particular periods. While rivers and creeks, are, from uniformity of seasons, confined to steady bounds, there will be little or no exhalation of febrile maismata from their shores. But when swelled beyond their natural heights by a wet winter and spring, they fall, and leave a very extensive surface of ground completely saturated with water, exposed to the action of the sun, and of course to the generation of, and exhalation of febrile miasmata. A country is always free from fevers during the overflow of its rivers—but subject to them after subsidence of the waters. It may be remarked, that a wet season is often healthy in the low, while it is sickly in the hill country, and I think the reason obvious. In the former, the rains cover all the moist ground entirely, while in the latter, they fall only in a sufficient quantity, to produce those degrees of moisture which favor febrile exhalations. The rains which fall in summer, are rendered harmless only by covering the whole surface of the ground. Frequent, and heavy rains after the middle of September, are favorable to health, diluting, and thus destroying as they do, the febrile miasmata that were produced by the heat, and moisture of the preceding summer. Man can do but little towards preventing the evil effects of drought upon the health of a country, but he can do much to avoid, or mitigate that which results from excess of moisture; by good culture of the earth, and draining the low grounds. I beg leave to suggest a few hints for obviating and preventing fevers. For this purpose, I would recommend that all trees between settlements, and the quarters or points, from which the summer and autumnal winds blow, be suffered to remain, and become as dense as possible, particularly if a river, creek, pond, or moist expanse of country be to windward of them. If the settlements have no forest defence, cultivate one of the trees which will soonest attain their growth, and not too far from the house or settlement. The trees about each house, should not be so close as to prevent a due evaporation of redundant moisture from the ground. If a reservoir or pond be near, allow the growth in it, and on its borders to continue, and if necessary, set around it additional trees. Trees to leeward of rivers, creeks, and ponds, can never be too numerous, or thick. Around a pond, they act in a small degree, mechanically. By sheltering it from the action of the sun, they lessen the exhalation, as well as obstruct the passage of the vapors that are raised, to the adjacent parts. But trees act likewise chemically. It has been demonstrated, that they absorb unhealthy air, and discharge it in a highly purified state, in the form of diphlogisticated air. The willow tree has been proved to purify the air more rapidly than any other. The rapidity of its growth, its early verdure, and the late fall of its leaf, all seem to designate it, as highly proper for this purpose. A second method of preventing fevers, is to let the cultivation always keep pace with the clearing of our lands. Nature has, in this instance, connected our duty, interest, and health together. Let every spot covered with moisture, from which the wood has

been cut, be carefully drained, and then ploughed and sowed with grass-seed; let weeds of all kinds be destroyed, and let the waters be so directed as to prevent their stagnating in any part of their course. These are the two principal means of extirpating fevers from our country; but as they are slow in their operation, I will suggest a few preventives, till the above remedies can take effect.

Whether the matter which produces fevers, be of an organic or inorganic nature, I do not pretend to determine: but it is certain that fire, or the smoke or heat from fire, destroys the effect of swamp or marsh miasmata upon the human body; from this cause, we find cities more healthy than country places, and commonly, the centre of cities more healthy than their suburbs, in the sickly months. Where it can be done, I would advise large fires to be made every evening, between the spots from whence the exhalations are derived and the house, as near the latter as is safe, and not troublesome. This practice should be continued till the appearance of two or three frosts, for frosts, as well as heavy autumnal rains, never fail to put a stop to the progress of intermittents. During the sickly season, fires should be likewise kept in every room in the dwelling-house, even when the heat of the weather makes it necessary to have the doors and windows open.

Let me advise all in sickly situations to prefer woollen and cotton clothes, to linen in the summer and autumnal months. Great confidence may be placed in woollen and cotton clothes, in raw, wet weather, as preventives of fever, but most in woollen.

The diet in the sickly months should be generous. Wine and beer should be the drinks of this season, instead of spirits and water. Fruits and vegetables are not unwholesome; but as the season of the year produces languor and weakness, a larger quantity of animal food than usual, is best calculated to oppose fevers. Salted meat, for this reason, is preferable to fresh meat. Food of all kinds, eaten during the sickly months, should be well seasoned.

The evening air should be avoided as much as possible. Before breathing the morning air, the body should be fortified with a little solid aliment, or a glass of bitters. These bitters should be made of centaury, wormwood, camomile, or the bark of the willow or dog-wood tree, infused in water. Bitters made with spirits, or even wine, cannot be taken in a sufficient quantity to do service, without producing intoxication, or the deadly habit of loving and drinking spirituous liquors.

The person should be bathed or washed frequently, and those who have not access to the sea, will find that adding salt to water, renders it powerful in preventing diseases. Preserve cleanliness in every species of apparel. Offal matters, should be removed from the neighborhood of dwellings. The excrements of domestic animals may be excepted, for nature has kindly prevented any inconvenience from them. More than this, she has endowed their dung with a power of destroying the effects of swamp, or marsh exhalations, and of preventing fevers. The cottagers of Europe, who live under the same roof, and even under the same roof with their cattle, are almost always healthy. These counsellings, are founded on practice and observation. Yours, respectfully,

A PATRON.

From the American Farmer.

AN EXPEDITIOUS METHOD OF MOVING HAY.

Culpepper county, Va. July 7th, 1838.

MR. SKINNER.—In the last number of your American Farmer one of your correspondents has described an expeditious mode of drawing hay to stacks, in use in Hardy county, Virginia. The same method was formerly adopted by some farmers in this county; but that now most generally used here, seems to be so much more easy and expeditious, that perhaps a description of the mode may deserve a place in your useful paper. So slow is the progress of even small improvements in agriculture, and labor-saving operations, that it is probable many of your readers have never seen this practised.

The hay being cocked, and the stacking about to be commenced, a hickory pole ten or twelve feet long, is procured, and the knots all well trimmed off. The larger end of the pole should have a hole bored in it, to admit a clivis pin, and to which the swingle tree of the horses in gear, is to be attached by means of the clivis. The smaller end of the pole should be brought to a smooth point, so as to admit its being run under the cocks of hay, and a leading line should be attached to the large end, about where the clivis goes through. A boy, holding this pole in one hand, thus fixed to the horse, and guiding the horse with the other, comes to the cock of hay. The pole is immediately disengaged, by taking out the clivis pin—the boy then runs the pole under the cock, till the sharp end has passed a little distance, say two or three feet on the other side: he then throws the line attached to the large end of the pole, across the top of the cock, and by a slight bow knot fastens it to the pole on the other side, taking care to have the rope placed exactly over the middle of the cock—the horse is then attached to the pole by fixing in the clivis; just as the horse sets off, it is necessary to take hold of the pole just behind the place where the rope is tied to it, to prevent its slipping, until the cock moves, when there is no longer any danger. After getting with the cock to the stack, without its being necessary even for the horse to stop, the knot is slipped, and the horse goes on with the pole, leaving the cock in nearly as good a situation as when it was first touched. There is less work for the hand-rake after the cocks thus drawn, than in the mode described by your correspondent, and the draft is much less. One horse will draw, with ease, cocks of three hundred weight, and as fast as two can pitch up to one stacker. The draft is less, in consequence of the hay next the horse being somewhat raised from the ground, and the friction against the ground greatly reduced.

Your constant reader,

A YOUNG FARMER.

RABBIT, CUNICULIS, IN ZOOLOGY.

Interesting and authentic account of some of its curious habits.

[This little animal affords a remarkable instance in the variety of its colors, of the effect of *domestication*. In its wild state, it is uniformly of a brown cast; when tamed, its color ranges

through every shade, from raven black, to the whiteness of mountain snow.

They begin to breed at a year old, sometimes sooner; and multiply five, six and seven times a year, having from four to eight at a litter, thus increasing so rapidly, that to say that "she breeds like a rabbit," is to express, proverbially, the idea of great fecundity.

When the buck approaches the doe, he first beats and stamps very hard with his feet, and after embracing her, falls backwards and lies motionless, as it were in a trance; in this state he may be readily taken, but he soon recovers from it.

The extent of rabbit warrens in England, where, in some districts, many hundred acres in a body are appropriated to the raising of rabbits for sale, would appear surprising to those who had never adverted to the subject. As inquiries have been made by correspondents relative to the proper construction of rabbit warrens. and their management, we give sketches from English authorities, which follow the interesting and curious remarks of Mr. Hardin, on the habits of that animal.—[Ed. Am. Far.

To the Editor of the American Farmer.

Near Shelbyville, Ky., 6th March, 1824.

Dear Sir—When we become subscribers to the American Farmer, I consider it a tacit admission, that we belong to the same social compact, and that our general experience is a kind of common property, upon which you have a right to draw whenever you may think it beneficial to its members.

And should any speculative theory appear in your columns, it is then either of us (whose experience conflicts with such theory) is substantially called on to contribute his mite. Under this impression (and not from a spirit of contradiction I assure you, sir,) do I give you some of the habits of the rabbit; which at once overturns the theory of Doctor Macaulay, in your 40th No. of Vol. 5, wherein he concludes that "the male rabbit de-"stroys the young, for the sole purpose of enticing "the embraces of the mother."

While I resided in Frankfort, I procured the white, the black, the gray, and the blue rabbits, and after a few years, some of the offspring turned out entirely yellow, or copperas-colored. As they were a rarity with us, I was not inattentive to their habits, and all that I relate of them is from *personal* observation. From the entire level of my lot, there was no bank, or hill side for them to burrow in, of course their cells were frequently deluged by rains, and their young drowned; to protect them from this casualty, I frequently dug down to the extremity of the hole, and fixed an inverted box over the place, so that the young might be placed in the box during hard rains. I castrated most of the males when young, so that at all seasons of the year, they were fit for table use: to distinguish the stags, I always split one of their ears, so that I might not be mistaken in catching them. Although I have never had a hundred at a time, yet I have had upwards of ninety. Like all domestic animals, they may be taught to come to food by any particular sound—I chose a a peculiar kind of whistle between the hands, and by shelling corn around me, could take by the ears any one of them without disturbing the rest. I would advise a southern hill side for a warren, and the only way I could prevent their burrowing out, was to place a row of bricks, laying them flat with their ends against the wall, and sunk only level with the surface, so as to form a nine inch pavement all around the warren; the rabbit will commence immediately at the wall to burrow out, the brick pavement prevents it. Some few days before parturition, the female burrows her hole from four to six or eight feet, and carries grass, hay, or whatever litter is most convenient, and forms her bed; she then closes the mouth of the hole by returning to it part of the dirt, and pressing it down with her fore feet, so as to leave no appearance of the hole. Just before parturition, she opens the hole and lines this bed with her own fur, and immediately after parturition she comes out, securely covers the hole, and runs in search of the buck, and *in less than ten minutes receives a new impregnation.* She does not visit her young but once in twenty-four hours, unless it is in the night, which I do not believe. I have seen them open the hole, go in, and uniformly *in two minutes by the watch* return, close the hole securely and leave it. I have then, by removing the box and examining the young, found them quite full. In about three weeks she leaves a small opening at the mouth of the hole, the young then occasionally come out, in a few days more she closes the hole when then are out, and when they are thirty days old she has a new litter. When I have wanted to use the young for broiling, I have at the time of parturition, and for some time after, kept the mother secluded from the buck, so that she might suckle them a few weeks longer. If these statements be true, Doctor Macaulay's supposition is without foundation. So much for facts, take my conclusions for what they are worth—my own conclusion has been, and still is, that at parturition, the mother leaves with the bed of young exactly the kind of odor, which accompanies her to the buck, after the first caresses she plays the coquet and hides from him; in his search for her, if he comes to the bed of young, (to which he is guided by the scent, unless they are very secure) he scratches them to pieces, not from motives of destruction to them, but to drive the doe (which he believes there hid) from her lurking place.

This too may be speculative theory, and I can have no objection to its being put down by one more plausible, tested by experience, and carrying with it more of the rational.

Respectfully, yours,

Mark Hardin.

P. S. You may think strange that I have gone so much into detail. This is my apology—long since some of your subscribers called for information respecting warrens, and I have never seen an answer to it, of course if he is not better supplied, what I have said is intended for his benefit.

M. H.

"The food of the tame rabbits may be cole wort and cabbage leaves, carrots, parsnips, apple rinds, green corn, and vetches, in the time of the year; also vine leaves, grass, fruits, oats, and oatmeal, milk-thistles, sow-thistles, and the like; but with these moist foods they must always have a proportionable quantity of the dry foods, as hay, bread, oats, bran, and the like, otherwise they will grow pot-bellied and die. Bran and grains mixed together have been also found to be very good food. In winter they will eat hay, oats, and

chaff; and these may be given three times a day, but when they eat green things, it must be observed, that they are not to drink at all, for it would throw them into a dropsy. At all other times, a very little drink serves their turn, but that must always be fresh."

"Rabbits are subject to two principal infirmities. First, the rot, which is caused by the giving them too large a quantity of greens, or from the giving them fresh-gathered, with the dew or rain hanging in drops upon them. It is excess of moisture that always causes this disease; the greens, therefore, are always to be given dry, and a sufficient quantity of hay, or other dry food, intermixed with them to take up the abundant moisture of their juices. On this account, the very best food that can be given them is the shortest and sweetest hay that can be got, of which one load will serve two hundred couples a year; and out of this stock two hundred may be eat in the family, two hundred sold to the markets, and a sufficient number kept in case of accidents.

"The other general disease of these creatures is a sort of madness: this may be known by their wallowing and tumbling about with their heels upwards, and hopping in an odd manner into their boxes. This distemper is supposed to be owing to the rankness of their feeding; and the general cure is the keeping them low, and giving them the prickly herb, called *tare-thistle*, to eat."

"The general computation of males and females is, that one buck rabbit will serve for nine does; some allow ten to one buck; but those who go beyond this always suffer for it in their breed."

[The estimate of the warren, on the estate of Thorseway, in England, of 1700 acres, as given by the tenant, Mr. Holgate, with the silver sort of rabbits is this:]

	£.	s.	d.
"Labor, three regular warreners, with extra assistants at killing,	85	0	0
Fences,	42	10	0
Winter food,	42	10	0
Nets, traps, &c. &c.	14	3	4
Delivery,	21	5	0
Rent is said to be 7*s.* an acre,	595	0	0
The capital employed is the above with the addition of stock paid for: suppose this as stated about three couple an acre at 2*s.* 4*d.*	595	0	0
	1395	8	4
Interest on that sum one year at 5 *per cent.*	69	15	5
	1465	3	9

Annual Account.

	£.	s.	d.
Expenses as above,	800	8	4
Interest,	69	15	5
	870	3	9
Produce 10,000 couple, at 2*s.* 4*d.*	1166	13	4
Expenses,	870	3	9
Profit,	296	9	7

Or about 22*l. per cent.* (the 5 *per cent.* included) on capital employed. This the writer observes is very great, reckoned on the capital, but small reckoned by rent, as it amounts to only half a rent. But suppose the gross produce of 1500, which he takes to be nearer the fact; then the account will stand thus:

	£.	s.	d.
Produce,	1500	0	0
Expenses,	870	3	9
Profit,	629	16	3

or 45 *per cent.* on the capital."

"It is remarked, that the author of the Treatise on Agriculture and Gardening, has bred these animals with much success and ornamental effect in a small artificial warren, in a lawn in the garden, made in the following manner.

"Pare off the turf of a circle, about forty feet diameter, and lay it on the outside; then dig a ditch within this circle, the outside perpendicular, the inner sloping, and throw earth sufficient into the middle to form a little hill, two or three feet higher than the level of the lawn; the rest must be carried away. Then lay down the turf on the hill, and beat it well to settle. The ditch at bottom should be about three feet wide, and three and a half deep, with two or three drains at the bottom, covered with an iron grate, or a stone with holes, to carry off the hasty rains, in order to keep the rabbits dry. In the outside bank should be six alcoves, the sides and top supported, either by boards or brick work, to give the rabbits their dry food in; by their different situations, some will always be dry; six boxes, or old tea-chests, let into the bank, will do very well. If the ground be very light, the outside circle should have a wall built round it, or some stakes driven into the ground, and boards or hurdles nailed to them, within a foot of the bottom, to prevent the bank from falling in. The entrance must be either by a board to turn occasionally across the ditch, or by a ladder. The turf being settled, and the grass beginning to grow, turn in the rabbits, and they will immediately go to work to make themselves burrows in the sides, and in the hill. By way of inducing them rather to build in the sides, to keep the turf the nearer, make a score of holes about a foot deep, and they will finish them to their own mind; and if there be a brick-wall round it, it should be built on pillars, with an arch from each, to leave a vacancy for a burrow." But there is, he says, another way that may be practised, which is, "to dig the ditch only about two feet deep, which will yield about earth enough to make the hill; put some pales, about a foot high, on the outside, for that will be a sufficient height to keep the rabbits in. Feed them as other tame rabbits are fed; and in wet weather sprinkle saw dust at the bottom, by which means the quantity of manure will be increased; once a week is often enough to take it way: the quantity will be surprising, nor will the smell be in the least offensive, even though it be quite close to the house. In a very large lawn, two or three of these hills, with the rabbits feeding on the tops, will not be unpleasing objects. If the bucks happen to be mischievous in killing the young ones, they must be chained in an alcove; or else have their liberty as in a warren. After a great snow they will want some assistance early next morning; because the ditch will be near-

ly filled, and perhaps the alcove, where the hay is, will be blocked up."

He adds, that "it is a great improvement to castrate the young bucks, and keep them till they are full grown, before you kill them; the flesh will be amazingly finer, whiter, and tenderer. But then it will be best to take them away, and keep them in another warren, lest they should be too numerous, and disturb the breeding does; or else have a few hutches in the alcove to fatten them in."

SEASON AND STATE OF CROPS IN HALIFAX.

To the Editor of the Farmers' Register.

Halifax, Va., Sept. 15th, 1838.

Since I wrote you, about the 12th of August, the drought has continued to prevail almost without a shower. We have not had rain enough to more than moisten the lightest land to the depth of 1 or 1½ inches since the 6th day of July. The effect of so long continued dry and such excessive hot weather as we have had, can perhaps be better imagined than described. The corn crop which, up to the 20th or 25th July, was the most promising I ever recollect to have seen in this county, is now certainly the worst, much the worst I ever saw any where. Many fields will yield but little if any more than the seed, and that of very inferior quality. In addition to the destructive effect of heat and drought, the chinch bug has fallen aboard of many fields and parts of fields, and nearly or quite finished the work of destruction. Many of our farmers seemed never to find that the the bug was injuring their corn until they commenced gathering the few blades that were left worth gathering. I am satisfied from what I have seen and heard from good authority, that there cannot be but little, if any more than ⅓ of a corn crop made in this county. Pittsylvania and Campbell certainly not more than half a crop.

Tobacco is, if possible, less promising than corn. We are generally, at this season, busily engaged, all hands cutting and curing tobacco, now we are almost without employment of any kind on the crop. Until yesterday, I had not seen a single plant of tobacco cut this season, and much the larger part will not be worth cutting at all, should we have early killing frost. We once hoped, on finding our corn crops failing, that we should certainly have rain in time to sow and raise a great many turnips to help us through the winter with our stock, that hope seems now almost gone. I have sowed, and know many of my neighbours that have, but what few came up, has all or very near all perished for want of moisture; in fact, I don't think *I* have one living. A PLANTER.

[The foregoing letter, though dated September 15th, was post-marked the 30th, and of course arrived after the last No. had been printed and issued. It is necessary that communications, to be inserted, should be in hand by the 25th of the month, at latest.]

SEASON AND STATE OF CROPS IN OCTOBER.

We have heard very little from correspondents, in October, of the state of crops, and therefore infer that the corn crop is no where *worse* than appeared from our last month's report, and that in the locations not there mentioned, it is *better*. On the fine Gloucester low-grounds there is a good crop made; and in King William, not a bad one. We hope that much of the corn-producing part of lower Virginia has so far escaped the general calamity, as to be able to furnish some surplus corn for the wants of the other parts of the country.

Since the last week in September, the rains have been superabundant, so as to make bad and slow work in sowing wheat. This, added to the small amount of fallow land prepared, (on account of the drought, in August and September,) will affect injuriously the product of the next crop.

After very early frost, in September, which hurt some tobacco in the upper counties, and which so alarmed many planters as to induce them to cut their crops too green, there has followed, and still continues, an unusual length of mild weather, in which every green crop could continue to improve in growth, or in maturity.

October 29, 1838.

PRINCEANA.

To the Editor of the Farmer's Register.

In several newspapers I have observed the following advertisement, of which I request a republication in the Farmers' Register, together with my comments thereon:

"*Competition.*—Much has been said lately about the superior growth of the morus multicaulis in Virginia, and the greater maturity of the wood for cuttings, &c. We now offer to exhibit one, two, three or more thousands of our trees with any plantation of one year's growth of the same kind existing in Maryland or Virginia; and if ours are not superior in the growth of the wood to any other parcel of similar extent, we will pay to the owner of the other parcel one thousand dollars, or one thousand of the trees, he agreeing to a similar forfeit if the reverse is the case. The truth is, their growth is as great in Connecticut and Rhode Island as in Virginia, and trees of two and three years old, are here found to be as hardy as an apple tree. WM. PRINCE & SONS,
Flushing, New York."

It is an old and approved saying, that "a wager is a fool's argument." But though Mr. Prince is no fool—and, on the contrary, no man is *sharper* in his vocation of selling plants, *to the best advantage*, still the saying is not the less true, applicable in a different sense; for though the wager is not offered *by* one, it is meant for the use *of fools*, or to make fools and dupes by its operation. This seeming offer to bet on the *superior growth* of his multicaulis trees, is simply a specimen of the "puff boastful;" a mere trick of Mr. Prince's trade, which he will abandon just as soon as any Virginian attempts to pin him to his wager, and make him responsible for it. To do this, Mr. Prince will be at no loss; for his advertisement offers plenty of "holes to creep through," and for him so to escape from the consequences of his blustering challenge. "The truth is," that Mr. Prince has

far too much sense to stick to any such bet as he *seems* here to offer. But if he dares to maintain his offer, in good faith, and will put it *in precise and definite terms*, so as to permit fair trial, comparison, and "competition," and so as to clear up fairly the point in question, (the superior growth and maturity of the wood, in open or naturally exposed culture, in Virginia and in New York,) then he can have the bet taken up much sooner than he wishes, and for a much larger amount than he here *pretends* to put at hazard.

The concluding assertion, that "*the truth is*, their growth is as great in Rhode Island and Connecticut as in Virginia," is so grossly and manifestly false, that it does not deserve any other than this mode of reply. I should as soon attempt seriously to disprove, what would be an equivalent assertion, that the climate of New England was as warm as that of Virginia, and the summers as long.

The numerous purchasers of the plants and seeds of the Messrs. Prince, have submitted, silently, long enough to their mode of dealing; and for them, in addition, to have also such gross imposition as this attempted—such insult offered to their understanding, is pressing too heavily, and perhaps dangerously, upon their forbearance.

The Messrs. Prince will not dare to repeat the offer of their bet in precise terms, and on fair conditions; or make themselves responsible for an issue so made up. ANTI-PUFF.

MONTHLY COMMERCIAL REPORT.

The grain and flour markets have been in a fluctuating state during the present month. Prices advanced in England, until the average of wheat reached 73 per quarter, when the duty being reduced to its minimum, all that was in bond, or that arrived at the moment, was entered for consumption, amounting to a million quarters, or 9,333,000 bushels of 60 pounds. The averages of the succeeding weeks were progressively lower, so that the duty gradually advanced, and this has prevented shipments of flour from the United States. The price of wheat in our markets has been $1 55 to $1 75. Of flour $8 to 8 50—supplies have not been large, except at New York, where receipts by way of the Erie Canal, &c., reach 4,000 to 11,000 bbls. daily. The seeding of wheat in Virginia is unusually late—excessive drought, succeeded by rains almost as excessive, having prevented the farmers from preparing their land.

The crops of wheat on the continent of Europe, are reported to be much below an average.

The price of tobacco has advanced in all European markets, and is fully supported on this side—ranging from $6 50 to $13 50 for lugs and leaf. The crop now preparing for market is variously estimated from 20,000 to 30,000, and that of Kentucky at 20,000 to 25,000 hhds. The quantity inspected in Virginia, for the year ending 1st inst., was 41,800, and the export to Europe 21,000 hhds. The receipts in New Orleans to same period, were 38,100, and the export 37,100, of which a large portion was shipped coastwise. The stocks in Europe are very moderate. The quantity manufactured in Virginia is 18,000 to 20,000 hhds. exclusive of 7000 hhds. leaf converted into stemmed.

The receipts of cotton are thus stated:

	1837.	1838.	
N. Orleans and Natches,	601,014	731,256	bales.
Mobile, - -	232,243	309,807	do.
Florida, - -	83,703	106,171	do.
Georgia, - -	262,971	304,210	do.
S. Carolina, -	196,377	294,334	do.
N. Carolina, -	18,004	21,439	do.
Virginia, - -	28,618	32,000	do.
At Northern ports inland, -		2,280	do.
	1422,930	1801,497	

A considerable quantity of old cotton remained in the country in October 1837, so that the relative production of the two years may be stated at 1,560,000 and 1,660,000 bales.

The exports to Foreign ports were:

	1837.	1838.	
To Great Britain,	850,786	1,165,155	bales.
France, -	260,722	321,480	do.
South of Europe	30,480	25,895	do.
North do -	26,437	63,099	do.
	1,168,525	1,575,629	

The quantity consumed in the United States, (not including the factories south and west of Virginia,) was, in 1837, 222,540—in 1838, 246,063 bales. These estimates are all made from October to October.

The stocks in all our ports October 1837, were 75,820 and October 1838, 40,300 bales.

The crop of the present year is supposed to be smaller than that of the last, particularly in the Atlantic States. In North Carolina and Virginia, it is not only much less in quantity, but inferior in quality. The price in Petersburg is 11 to 12 cents, being ½ cent below that of old, the stock of which is nearly exhausted. The mills at this place are all in active operation, and the erection of new ones proposed.

The attention of some of our most enterprising farmers is now directed to the culture of silk, for which preparations are making, and no doubt is entertained of its success. Speculations in the *morus multicaulis* are carried to a surprising extent in every part of the country, and fortunes have been made from the reproduction of a few twigs.

The extension of the great line of railroads is now about to be undertaken, from Raleigh to Columbia, S. C., which will nearly complete the chain from Maine to Alabama—what, with steam ships and locomotives, space will be annihilated.

Oct. 29th, 1838. X.

Our correspondent, T. S. Pleasants, having seen the sheet (after the printing was finished,) containing the extracts of his private letters, deemed it necessary, to prevent the appearance of his having assumed too much, that it should be stated, that T. M. Randolph, esq., first suggested the scheme, and obtained from the government the lease of the Bellona Arsenal, for silk-culture; and that Pleasants became, by subsequent arrangement, one of the joint tenants and occupants of the property.

From Lawrence on the Horse.

DESCRIPTION OF A WELL FORMED HORSE.

The head of a horse should be void of flesh, and for length and size appear to hold fair proportion with the size of his body; his eye full, and somewhat prominent; eye-lids thin and dry; ears thin, narrow, erect, of middling length, and not distant from each other; forehead flat, not too large or square and running nearly in a straight line to the muzzle, which should be small and fine; nostrils capacious; lips thin; mouth of sufficient depth, and the tongue not too large; the jaw-bones wide at top, where they join the neck; the head not abruptly affixed to the extremity of the neck, but with a moderate curve and tapering of the latter.

The neck must be of moderate, not too great length, nor too thick and gross on the upper part, nor too large and deep, but rising from the withers or forehand, and afterwards declining and tapering at the extremity, it will form somewhat of an arch; underneath, the neck should be straight from the chest, and by no means convex or bellying out.

The shoulders capacious, and of large extent, so as to appear the most conspicuous part of the body, but without being loaded with flesh; they should reach fairly to the top of the withers, which must be well raised; the chest should be sufficiently full, not narrow or pinched.

The body deep and substantial; back, a plane of good width, but handsomely rounded; backbone, straight, or with a trifling inclination, and not too short; loins wide, and the muscles of the reins, or fillets, full and swelling on each side of the backbone; the space sufficient between the ribs and hip bones, the bones themselves round, and the buttocks deep and oval; the rump level with, or not too much elevated above the height of the withers; the croup must have reasonable space, and not sink too suddenly, in which case, the tail would be set on too low, which ought to be nearly on a level with the back.

The hinder quarters should spread to a wider extent than the fore-parts, and the hind-feet stand farther asunder than those before; the thighs should be straight, large, muscular, and of considerable length; the hock wide and clean; the shank not too long but flat, and of sufficient substance, its sinew large and distinct, the fetlocks long; the hocks should form an angle of such extent as to place the feet immediately under the flanks. The fore-arms, like the thighs, should be large, muscular, and of good length, the elbows not turning outwards; the knees large and lean; the shank or cannon-bone, flat, strong, and not too long; the tendon large; the fore-arm and shank must form nearly a straight line; fetlock-joints large and clean; pastern inclining to a certain degree, not too long, but large in proportion to their length; the coronary rings not thick or swelled, but clean, dry, and hairy; the feet neither too high nor too flat, and of size apparently a sufficient base for the weight they have to sustain; hoofs, of color dark and shining, without seams or wrinkles, tough and strong, not hard like oak; foot internally concave, soal hard, but not shrunk, heels wide, and of middling height; frog not too large or fleshy, but tough and sound; the feet of equal size, should stand exactly parallel, so that the front or toe incline neither inward nor outward; the fore-feet should stand perpendicular to the chest, not too much under it, and they should be less wide apart that the fore-arms; the legs should not be loaded with hair.

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